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99th Congress, 2d Session - - - - - - - - - - House Document 99-167

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SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT, ILLINOIS

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

TRANSMITTING

A CORPS OF ENGINEERS REPORT ON THE SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT, ILLINOIS, IN PARTIAL RESPONSE TO A RESOLUTION ADOPTED OCTOBER 11, 1969, BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES HOUSE OF REPRESENTATIVES

FEBRUARY 25, 1986.—Referred to the Committee on Public Works and Transportation and ordered to be printed with illustrations

U.S. GOVERNMENT PRINTING OFFICE
57-912 O WASHINGTON : 1986

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LETTER OF TRANSMITTAL

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103

7 FEB 1986

Honorable Thomas P. O'Neill, Jr.
Speaker of the House of Representatives
Washington, D. C. 20515

Dear Mr. Speaker:

I am transmitting herewith a report dated January 24, 1984, from the Chief of Engineers, Department of the Army, on South Quincy Drainage and Levee District, Illinois, together with other pertinent reports. The report is in partial response to a resolution adopted October 11, 1969, by the Committee on Public Works and Transportation of the House of Representatives.

The views of the State of Illinois, the Departments of the Interior, Agriculture, and Housing and Urban Development are set forth in the enclosed communications, together with other pertinent replies.

I concur in the plan recommended in the report of the Chief of Engineers subject to enactment of generic cost sharing legislation.

The Office of Management and Budget concurs in the above with cost sharing consistent with Administration policy and advises that there is no objection to the submission of this report to the Congress. A copy if its letter is enclosed.

Sincerely,

Robert K. Dawson
Assistant Secretary of the Army
(Civil Works)

Enclosures

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COMMENTS OF THE OFFICE OF MANAGEMENT AND BUDGET

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON D.C. 20503

December 16, 1985

Honorable Robert K. Dawson
Assistant Secretary of the
Army for Civil Works
Room 2E570 - Pentagon
Washington, D.C. 20310

Dear Mr. Dawson:

On July 19, 1985, you sent us a copy of the report of the Chief of Engineers on South Quincy Drainage and Levee District, Illinois, with your recommendations and draft transmittal letter to Congress. We have completed our review of this project as required under Executive Order 12322.

The Office of Management and Budget does not object to your submitting this report to Congress. The Administration supports authorization of this project for construction in accordance with your recommendations contingent upon passage of cost-sharing legislation consistent with Administration policy.

Sincerely,

Randall E. Davis
Associate Director
for Natural Resources,
Energy and Science

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COMMENTS OF THE GOVERNOR OF ILLINOIS

STATE OF ILLINOIS
OFFICE OF THE GOVERNOR
SPRINGFIELD 62706

JAMES R. THOMPSON
GOVERNOR

August 1, 1983

Lt. General J.K. Bratton
Chief of Engineers
Attn: DAEN - CWP
Department of the Army
Washington, D.C. 20314

Dear General Bratton:

I have received your Proposed Report for South Quincy Drainage and Levee District. The concerned state agencies have carefully reviewed the District Engineer's report and are in accord with his findings and recommendations. I therefore, concur with your report

Sincerely,

James R. Thompson
GOVERNOR

JRT:psw

cc: Director Vonnahme

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United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 83/675

September 2, 1983

Lieutenant General J. K. Bratton
Chief of Engineers
ATTN: DAEN-CWP
Department of the Army
Washington, D.C. 20314

Dear General Bratton:

Thank you for the letter of May 17, 1983, requesting our views and comments on the proposed report of the Chief of Engineers and the final environmental statement for Flood Damage Reduction, South Quincy Drainage and Levee District, Illinois.

Proposed Report of the Chief of Engineers

We generally concur with the findings of the Chief of Engineers; however, we note two unresolved issues regarding our mitigation proposals. In one issue, the Rock Island District believes mitigation for loss of 3.5 acres of bottomland hardwoods is not justified because the habitat type is abundant in the project area.

We believe bottomland hardwoods in the project area, represented by a mixture of black willow, cottonwood, silver maple, and box elder, as well as green ash, sugarberry, black cherry, eastern redbud, shagbark hickory and several types of oaks in some areas, should be designated as Resource Category 3 of the Fish and Wildlife Service's (FWS) Mitigation Policy (Fed. Reg., Vol. 46, No. 15). For Resource Category 3, the Designation Criteria states, "Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis." Further, our designation of these bottomland hardwood acreages as Resource Category 3 is consistent with the evaluation of habitat types in "Technical Report D, Environmental Report, Comprehensive Master Plan for the Management of the Upper Mississippi River System." The Mitigation Goal for Resource Category 3 states, "No net loss of habitat value while minimizing loss of in-kind habitat value."

The second issue refers to the use of borrow areas along Mill Creek. If the use of upland or agricultural borrow sites is not feasible, an on-site survey between the Rock Island District and the FWS Rock Island, Illinois, Ecological Services Field Office should be conducted to determine the least damaging areas and methods of borrow removal.

We recommend that the Rock Island District and the FWS Rock Island Field Office coordinate further regarding these issues.

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Final Environmental Statement

The document did not evidence the completion of historical or architectural studies for the area. Further coordination with the Illinois State Historic Preservation Officer (SHPO) should be accomplished prior to implementation of the proposed plan. The SHPO should be contacted to insure compliance by the Corps of Engineers with all preservation legislation.

We appreciate the opportunity to comment on this proposal.

Sincerely,

Bruce Blanchard, Director
Environmental Project Review

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DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C 20314

REPLY TO ATTENTION OF:
Planning Division

January 24, 1984

Mr. Bruce Blanchard
Director
Environmental Project Review
U. S. Department of the Interior
Washington, D. C. 20240

Dear Mr. Blanchard:

This is in response to your letter of September 2, 1983, concerning the South Quincy Drainage and Levee District, Illinois, project report.

You raised two issues related to the mitigation aspects of the project including the mitigation for the loss of 3.5 acres of bottomland hardwoods and the use of borrow areas along Mill Creek. Please be assured that the Rock Island District will continue to coordinate with the Fish and Wildlife Service's Rock Island Field Office during post-authorization planning regarding these concerns.

I appreciate your comments on this project.

Sincerely,

FOR J. K. Bratton
Lieutenant General, U. S. Army
Chief of Engineers

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COMMENTS OF THE DEPARTMENT OF AGRICULTURE

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20250

SUBJECT: I

Lieutenant General Joseph K. Bratton
Chief of Engineers
Office of the Chief of Engineers
Army Corps of Engineers
U.S. Department of the Army
Washington, D.C. 20314

Dear General Bratton:

Thank you for the opportunity to review the proposed report on the South Quincy Drainage and Levee District, Illinois, together with other pertinent reports and a Final Environmental Impact Statement.

We note from the report that most of the expected flood damages would affect 14 commercial and industrial firms. Corn and soybean losses account for $150,000 of the $3.3 million average annual flood damages. Raising 8.8 miles of the existing levee and building 0.4 of a mile of new levee and floodwall are economically feasible. These measures would reduce average annual flood damages by 87 percent.

The recommended plan is not contrary to or in conflict with this Administration's policies or programs. We have no objection to the recommended plan.

Sincerely,

John R Block

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COMMENTS OF THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

U.S. Department of Housing and Urban Development
Chicago Area Office, Region V
547 West Jackson Boulevard
Chicago, Illinois 60606

17 JUN 1983

Lieutenant General J.K. Bratton
Chief of Engineers
Attention: DAEN-CWP
Department of the Army
Washington, D.C. 02314

Dear Mr. Bratton:

Subject: South Quincy Drainage & Levee District

Thank you for the opportunity to comment on the subject project. The EIS and accompanying reports provide a wealth of material on the project, amply justifying selection of the impacts and the alternatives section clearly evaluated the differences between each alternative. Our comments on the project are limited for the following:

1. Neither our office nor our Regional Office have any record of receiving the Draft EIS.

2. The 11 month gap between the publication of the Final EIS and its dissimination is puzzling.

3. The assumption that increased floodplain protection will not enhance the protected area's growth is questionable. Elimination of the flood insurance requirement by itself would provide a significant economic incentive.

4. The current "Flood Damage Mitigation" issue paper being circulated by the Illinois State Water Plan states that "the cause of flooding problems in some rural areas is now being recognized as the cumulative increase on flood stages due to the construction of rural agricultural levees." This recognition points to the need to evaluate the impact of the project in terms of its taking away flood storage and possibly increasing flooding elevations elsewhere.

Sincerely,

Everett H. Rothschild
Area Manager

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SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT, ILLINOIS

REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO ATTENTION OF

DAEN-CWP-A

January 24, 1984

SUBJECT: South Quincy Drainage and Levee District, Illinois

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on South Quincy Drainage and Levee District, Illinois. It is accompanied by the reports of the Board of Engineers for Rivers and Harbors and the Division and District Engineers. These reports are in partial response to a resolution adopted 11 October 1969 by the Committee on Public Works of the United States House of Representatives. The Committee requested the Board of Engineers for Rivers and Harbors to review prior reports with a view to determining whether any modification for flood control and allied purposes on the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River are advisable. This is the third interim report pursuant to this authority.

2. The Division and District Engineers considered various structural and nonstructural plans for resolving potential flood problems along the Mississippi River in the South Quincy Drainage and Levee District. The reporting officers' recommended plan includes raising the existing levee and floodwall about 3.5 feet for a distance of about 8.8 miles and providing 0.4-mile of new levee and floodwall. The first cost, based on October 1981 prices, is estimated at $9,889,000. Average annual costs, based on an interest rate of 7-5/8 percent and a 100-year period for economic analysis, are $818,300. Average annual benefits are estimated at $4,323,000 and the benefit-cost ratio is 5.3.

3. The Board concurs generally in the views and recommendations of the reporting officers. The Board notes that the reporting officers considered an alternative ring levee plan to provide increased flood protection for the industrial area alone. Although economically justified, ring levee alternative plans would increase protection to only a small percentage of the District, have a higher first cost than the recommended plan, and would not maximize net benefits to the National Economic Development account. The Board believes that the proposed plan is in compliance with Executive Order 11988 and that future development in the project area will be primarily expansion of existing industries that would occur with or without a greater level

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of flood protection. Accordingly, the Board recommends that modification of the Federal project at South Quincy Drainage and Levee District be authorized for implementation generally in accordance with the reporting officers' plan. Project first cost, based on October 1983 price levels, is estimated at $11,307,000. Average annual charges, based on 8-1/8 percent interest rate and a 100-year period for economic analysis, are estimated at $1,156,500. Average annual benefits are estimated at $6,784,000, and the benefit-cost ratio is 4.1. The Board also recommends the plan subject to cost-sharing and financing arrangements satisfactory to the President and the Congress.

4. The Administration's position on cost sharing and financing of flood control is that 35 percent of assigned construction costs are to be financed during the period of construction by non-Federal interests, or if the project is covered by Section 3 of the Flood Control Act of 1936, as amended, then non-Federal interests are to provide the value of lands, easements, rights-of-way, and relocations required for project construction, if these requirements are greater than 35 percent. Operation, maintenance and replacement costs would also be a non-Federal responsibility. A portion of the non-Federal share may be paid, with interest, over a period not to exceed 50 years from initiation of construction, when payment during construction would be an undue burden on the non-Federal sponsor.

5. I note that the recommended plan is the National Economic Development plan. Accordingly, I concur in the findings, conclusions and recommendations of the Board.

FOR J. K. BRATTON, MG, USA
Lieutenant General, USA
Chief of Engineers

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DEPARTMENT OF THE ARMY
BOARD OF ENGINEERS FOR RIVERS AND HARBORS
KINGMAN BUILDING
FORT BELVOIR, VIRGINIA 22060

REPLY TO ATTENTION OF

BERH-PLN

25 March 1983

SUBJECT: South Quincy Drainage and Levee District, Illinois

Chief of Engineers
Department of the Army
Washington, DC 20314

Summary of Board Action

The Board finds that the plan for increased flood protection in the South Quincy Drainage and Levee District is needed and is economically justified and environmentally acceptable. The Board concurs in the reporting officers' plan to raise 8.8 miles of existing levee and provide 0.4-mile of new levee and floodwall. The level of flood protection to industrial, commercial, residential, and agricultural property would be increased from a 50-year reoccurrence interval to 500 years. The project first cost is estimated at $10,384,000, and the benefit-cost ratio is 4.8. The Board recommends implementation of the proposed project subject to cost-sharing and financing arrangements satisfactory to the President and the Congress.

Summary of Report Under Review

1. Authority. The feasibility report on South Quincy Drainage and Levee District, Illinois, is the third interim report in partial response to a House of Representatives Committee on Public Works Resolution adopted 11 December 1969. The resolution is quoted as follows:

"Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River, printed in: House Document Numbered 107, 81st Congress, First Session; House Document Numbered 281, 83rd Congress, Second Session; and House Document Numbered 247, 83rd Congress, Second Session, with a view toward determining whether any modifications of the existing projects should be made at this time in the interest of providing increased flood control, and for allied purposes, on the Mississippi River."

A final report in full response to the study resolution will be submitted later.

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2. Description of study area. The study area is the Mississippi River floodplain between river miles 318.5 and 325.5 in the vicinity of Quincy, Illinois. Agriculture is the predominant land use, with commercial, industrial, and residential property occupying less than 3 percent of the area. Industrial-commercial development is valued in excess of $300 million and approximately 1,100 people are employed in the developed area.

3. Existing improvements. Local interests constructed about 9 miles of levee in 1913 to protect against Mississippi River flooding. This system was improved by the U.S. Army Corps of Engineers in 1967 to provide protection against a 50-year frequency flood.

4. Problems and needs. The primary problem is the threat of flooding within the South Quincy Drainage and Levee District, resulting in the need for additional flood protection. Most flooding results from a combination of snowmelt and heavy rainfall over the Upper Mississippi River Basin. Seepage damages in the District from the 1973 flood event were $1,200,000 ($2,325,000 in 1981 dollars). Overtopping or levee failure would cause damages estimated to exceed $164 million under existing conditions.

5. Improvement desired. Local interests desire a higher level of flood protection for the entire drainage and levee district.

6. Alternatives considered. Consideration was given to increasing the height of existing levees protecting the entire district, providing new levees to protect only the commercial-industrial area, and to nonstructural measures such as flood-proofing, evacuation, and disaster relief programs.

7. Plan of improvement. The recommended plan involves raising 8.8 miles of existing levee about 3.5 feet and providing 0.4-mile of new levee and floodwall. The plan would provide protection from the 500-year frequency flood event. The mainstem Mississippi River levee would be raised with hydraulic fill and the flank levees along Curtis and Mill Creeks would be raised with impervious material from adjacent borrow areas. Associated features of the selected plan include raising and resurfacing existing road ramps, ramping of State Highway 57 at the Mill Creek flank levee crossing, constructing a railroad closure structure at the Curtis Creek flank levee crossing, and modifying the discharge lines at the existing pumping plant. The plan would reduce average annual flood damages by 87 percent.

8. Economic evaluation. Based on 1981 price levels, the District Engineer estimates the total first cost of the proposed project at $9,889,000. Annual charges, based on 7-5/8 percent

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interest rate and a 100-year period for economic analysis, are $818,300. Average annual benefits are estimated at $4,323,000, and the benefit-cost ratio is 5.3.

9. Project effects.

a. Environmental. Ecosystems on the 55 acres required for rights-of-way would be permanently degraded, and existing vegetation would be replaced with generally low-quality levee vegetation. There will be a small loss of agricultural production and wildlife habitat. Selected dredging in the backwater slough areas of the Mississippi River to obtain sand for the levee raise would improve fisheries habitat. Air, water, and noise pollution would increase during construction; however, these effects would be temporary and would cease after construction is completed.

b. Economic. Reduction of flood damages will have a beneficial economic effect both locally and regionally. The cost of flood fighting and clean up would also be reduced or eliminated by the project.

c. Social. A variety of other effects would result from implementation of the selected plan. The threat of interruption of public services and utilities would be significantly reduced. Rail and highway traffic would no longer be impaired. Increased safety, social stability, and well-being would also result for residents of the area.

10. Recommendation of the reporting officers. The District Engineer recommends that the existing Federal project for the South Quincy Drainage and Levee District be modified to provide a 500-year level of protection from flooding on the Mississippi River and Curtis and Mill Creeks in accordance with the selected plan described in his report. His recommendation is subject to cost-sharing and financing arrangements satisfactory to the President and the Congress. The Division Engineer concurs.

Review by the Board of Engineers for Rivers and Harbors

11. General. The Board's review encompassed the overall technical, economic, social, environmental, and policy aspects involved in the improvements proposed by the reporting officers, including conformance with the essential elements of the Water Resources Council's Principles and Standards for Planning Water and Related Land Resources. The Board also considered the views of local interests, as well as Federal and State agencies.

12. Responses to the Division Engineer's public notice. The Division Engineer issued a public notice on 5 November 1982 stating his findings and recommendations and inviting interested

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parties to present additional information to the Board. Three letters were received in response to the public notice. The Chairman of the Adams County Soil and Water Conservation District initially expressed reservations about the economic feasibility of the proposed project and concern that raising the levee may encourage more construction in the floodplain. However, in later correspondence he did not object to raising the levee. The Regional Director of the Department of Interior, National Park Service, indicated that the proposed plan will not adversely affect any area or jurisdiction of the National Park Service.

13. Findings and conclusions. The Board of Engineers for Rivers and Harbors concurs in the findings and recommendation of the reporting officers. The recommended improvements are economically justified and engineeringly and environmentally acceptable, and the requirements of local cooperation are generally appropriate. The Board believes that the reporting officers' proposed plan will provide a significant contribution to the regional economy, and that the beneficial effects will outweigh any adverse impacts.

14. The reporting officers considered an alternative ring levee plan to provide increased flood protection for the industrial area alone. Although economically justified, the ring levee would increase flood protection to only a small percentage of the District, have a greater first cost than the recommended plan, and would not maximize net benefits to the National Economic Development account. The Board notes that the level of flood protection provided by the existing levee system has encouraged industrial expansion. The Board believes that the proposed plan is in compliance with Executive Order 11988 and that future development in the project area will be primarily expansion of existing industries that would occur with or without greater levels of flood protection.

15. Total project first cost, based on October 1982 price levels, is estimated at $10,384,000. Average annual charges, based on a 7-7/8 percent interest rate and a 100-year period for economic analysis, are estimated at $888,800. Average annual benefits are $4,305,300, and the benefit-cost ratio is 4.8.

16. Recommendations. The Board recommends that modification of the Federal project for flood protection at South Quincy Drainage and Levee District, Illinois, be authorized for implementation generally in accordance with the reporting officers' plan, with such modifications as in the discretion of the Chief of Engineers may be advisable, and in accordance with cost-sharing and financing arrangements satisfactory to the President and the Congress. The estimated first cost to the United States for implementation, based on October 1982 price levels and tradi-

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tional cost-sharing policies, is $10,077,000. This recommendation is made with the provision that, prior to implementation, non-Federal interests will agree to comply with the following requirements:

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction and subsequent maintenance of the project;

b. Hold and save the United States free from all damages arising from construction and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors;

c. Maintain and operate the works, including beautification measures after completion, in accordance with regulations prescribed by the Secretary of the Army;

d. Make all relocations and alterations of buildings, utilities, roads, and other facilities except railroad bridges, ramps, and approaches thereto, where necessary in implementation of the project;

e. Prevent encroachment on any of the flood protection structures, including existing ponding areas, and if these ponding areas are impaired, provide substitute storage capacity or equivalent pumping capacity without cost to the United States; and

f. Publicize floodplain information in areas outside the protection and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain.

FOR THE BOARD:

E. R. HEIBERG III
Major General, USA
Chairman

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REPORT OF THE DISTRICT ENGINEER

SYLLABUS

A study was authorized in 1969 to investigate the feasibility of improving levee systems along the Mississippi River from Coon Rapids Dam to the mouth of the Ohio River.

This report represents the results of one portion of that study. It is concerned with the South Quincy Drainage and Levee District. The district consists of 5,800 acres of which 3,800 acres are cropland, 165 acres are in industrial-commercial-residential, and 1,835 are in lakes, bottom land forests, and other uses. The industrial-commercial facilities are concentrated in the northeast portion of the district and have an estimated value in excess of $300 million.

This study evaluated the economic and environmental feasibility of raising the existing line of protection and several other alternatives. The tentatively selected plan involves raising the existing line of protection approximately 3.5 feet (500-year level), using hydraulic fill for the main stem levee and clay borrow for the tie-back levees proposed along Curtis and Mill Creeks. The proposed project would produce net economic benefits of $3,505,000 and has a benefit-to-cost ratio of 5.3 to 1.0, based on a 100-year economic life and a discount rate of 7-5/8 percent. The most significant impact of the project would be the loss of 55 acres of cropland, pasture, bottom land forests, and sloughs to expand the existing levee section and seepage berms. The estimated total first cost of the project is $9,889,000.

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MISSISSIPPI RIVER
COON RAPIDS DAM TO OHIO RIVER
FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION
SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
ILLINOIS
INTERIM REPORT NO. 3

SECTION 1 - INTRODUCTION

STUDY AUTHORITY

Studies were conducted in response to a resolution passed by the Committee on Public Works of the House of Representatives, adopted 11 December 1969.

This report summarizes the investigations conducted to determine the feasibility of providing increased flood damage reduction measures for the city of Quincy, Illinois, the South Quincy Drainage and Levee District, Illinois, and the Fabius River Drainage District, Missouri.

The study results indicate that Federal participation in improvements is warranted only for the South Quincy Drainage and Levee District. The costs for improvements for the other areas far exceeded the benefits to be derived. Benefit-to-cost ratios for the most feasible plans were 0.55 for the city of Quincy, 0.23 for the Fabius River Drainage District, and 0.6 for South River Drainage District. This report, therefore, will be concerned with only the South Quincy Drainage and Levee District. The final report under the authority will further address the areas in which Federal participation was not warranted.

STUDY PURPOSE AND SCOPE

The scope of this study is to evaluate alternative measures to reduce flood damages and to enhance water and related land resources within a limited area of the overall area encompassed by the study authority. Plate 1 is a location map of the study area.

Several alternative plans to reduce potential flood damages in the study area were considered. Detailed estimates of costs and benefits were prepared, and evaluations of environmental and social impacts were made in selecting the most feasible plans. Comments and preferences expressed by local interests, concerned agencies, and the affected states were considered in formulating the plans.

Studies were made in the depth and detail needed to permit plan selection and to determine the economic/environmental feasibility of the plans.

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PRIOR STUDIES, REPORTS, AND EXISTING WATER PROJECTS

Several interim reports for flood control on the Mississippi River have been prepared. Three of these were cited in the resolution authorizing this study and are of particular interest in this investigation.

One report concerned an investigation for flood protection at Canton, Missouri, which resulted in the authorization of a project for levees and appurtenant works. This project was completed in 1964.

The second report covered the investigation of 17 local flood protection projects. Construction of all but one, which has been classified as inactive, has been completed.

The third report covered investigation for improvement of the Mississippi River levee of the Sny Island Levee Drainage District, Illinois. This project was authorized and construction was completed in 1968. Plate 1 shows each of the projects. The projects consist of about 325 miles of levees which protect about 300,000 acres of highly developed agricultural lands in the Mississippi River flood plain.

Other flood control reports that may have a bearing on the study include a seepage report concerning damage and compensation to levee and drainage districts, entitled "Mississippi River between Missouri River and Minneapolis, Minnesota, Damages to Levee and Drainage Districts," House Document 135, 84th Congress, 1st Session; the Sny Basin Report which discusses levees and interior drainage in the Sny Island Levee Drainage District; and a report on the Gregory Drainage District, Missouri, which also resulted in a local protection project.

More recent reports, under the current authorization, include two interim reports which recommended improvements to the Muscatine Island Levee District, Iowa, and the Green Bay Levee and Drainage District No. 2, Iowa. Those reports are presently being processed at the Washington level.

SECTION 2 - PLAN FORMULATION

The objective of plan formulation is to identify a practical and acceptable solution to the problems and needs identified in the study area. Both nonstructural and structural alternatives are considered. Possible solutions are identified and evaluated individually. Combinations of compatible solutions are investigated.

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ASSESSMENT OF WATER AND LAND RESOURCES PROBLEMS AND OPPORTUNITIES

EXISTING CONDITIONS

The study area is located in the Mississippi River flood plain between river miles 318.5 and 325.5. It is bounded by the Mississippi River on the west, the river bluffs on the east, Curtis Creek on the north, and Mill Creek on the south. The South Quincy Drainage and Levee District consists of approximately 5,800 acres of which 3,800 acres are cropland, 165 acres industrial-commercial-residential, and 1,835 acres are in lakes, bottom land forests and other uses. The industrial-commercial facilities are concentrated in the northeast portion of the district and have an estimated value in excess of $300 million. The wastewater treatment facility for the city of Quincy, Illinois, is located adjacent to the industrial development. It is protected by a separate ring levee affording a 500-year level of protection.

FUTURE CONDITIONS

The future conditions in the project area without any additional resource management measures are essentially the same as the present conditions with the exception of the industrial-commercial sector. Future industrial growth will be primarily expansion of existing facilities with little influx of new industries. Industrial investment in the flood plain is expected to increase by over $200 million in 20 years to a total of $525 million. Little or no additional residential growth is anticipated. The current permanent flood protective works would continue to provide protection in the project area. Established programs involving flood warning, flood fighting, and flood disaster relief are expected to remain functional.

PROBLEMS, NEEDS, AND OPPORTUNITIES

About 8.8 miles of earth levee constructed by local interests and improved by the Federal Government provides some degree of protection for the drainage district. This existing system was designed and built to provide protection against a flood having a 2 percent chance of being equalled or exceeded in any year, a 50-year flood. It was based on data developed in the 1940's and approved in 1954. Application of the current discharge-frequency relationships, determined through guidelines contained in the US Water Resources Council Bulletin 17A, lowers the elevation of the 50-year frequency design level by approximately 0.4 foot below this existing design level height. Development of recent flood data, high costs of massive emergency operations, seepage damage, and preventive evacuation have all emphasized the need for additional protection.

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Most of the flooding in the district results from a combination of snowmelt and heavy rainfall over the Upper Mississippi River Basin. Flooding has frequently threatened the agricultural land within the South Quincy Drainage and Levee District.

The damage potential that exists from the threat of levee failure or overtopping is great. Damages in the district from the 1973 flood were $1,200,000 ($2,325,000 in 1981 price levels). These damages were generally attributed to seepage. If overtopping or levee failure had occurred, it is estimated that damages would have exceeded $34 million ($164 million under current conditions). Since most of the drainage district is in agricultural production and is not intensely inhabitated and because most residents would have evacuation time, health, safety, and well-being considerations are not as great. A risk does exist, however, for those involved in emergency evacuation and protective measures. Also, levee failure could displace residents from their homes for up to two months.

The primary problem and needs in the drainage district stem from the threat of flooding and the need for additional flood protection.

PLANNING CONSTRAINTS

The following planning constraints were used in the detailed Stage 3 plan formulation studies.

* Feasible projects will comply with the principles of Executive Order 11988 which addresses flood plain management and Executive Order 11990 concerning the protection of wetlands. Project planning must be accomplished to minimize project effects on flood plains in general, and on wetlands and other environmental features. Mitigation must be considered where applicable.

* Project formulation will adhere to the criteria of the State of Illinois regarding the regulatory floodway. These criteria provide that the effects of any flood control measure should not significantly increase flood heights, flood velocities, and potential flood damages. Also, such measures should not increase erosion, sedimentation, or other risks to public health and safety.

* Project formulation and impact assessment will be conducted in accordance with appropriate Federal and State environmental statutes including the National Environmental Policy Act (NEPA) and the Endangered Species Act.

* All other items of the study will be in accordance with the standards of the Corps of Engineers. These standards will be especially adhered to during studies concerning degree of protection, degree of encroachment, and nonstructural considerations.

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PLANNING OBJECTIVES

Planning objectives are derived from an analysis of problems, needs, and opportunities of the study area that can be addressed to enhance the two national objectives: National Economic Development (NED) and Environmental Quality (EQ). Based on an analysis of the problems and needs of the study authority which directs the Corps of Engineers to review existing projects in the interest of providing increased flood control, the following specific planning objective has been identified:

To develop a flood damage reduction program for the high quality agricultural lands, existing industrial and commercial facilities to reduce economic losses between Mississippi River miles 318.0 to 325.2 for the 1985-2085 period of analysis.

ALTERNATIVE PLANS

MANAGEMENT MEASURES

Possible solutions considered to alleviate the flood problem within the study area included both nonstructural and structural measures. The alternative that no Federal action be taken was also considered.

STRUCTURAL SOLUTIONS

Structural solutions involve such measures as levees, ringwalls, floodwalls, channel improvement, and flood control reservoirs. Levees, ringwalls, and floodwalls provide protection by serving as a physical barrier between the river and adjacent flood-prone land. Channel improvement helps to alleviate flood problems by increasing the flow efficiency of the channel. Flood control reservoirs reduce flood flows by temporarily storing water.

NONSTRUCTURAL SOLUTIONS

Nonstructural solutions include such measures as flood plain zoning, floodproofing, flood plain evacuation, and flood warning systems. Zoning or other regulatory controls provide a planned program and regulate development and land use, thereby preventing future development that could suffer large flood damages. Floodproofing involves providing barriers or raising structures to reduce the effects of flooding. Flood plain evacuation may be temporary or permanent. Temporary evacuation serves to protect the people of an area and their personal property. Permanent evacuation

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involves removing buildings and prohibiting new construction on flood-prone lands. Flood warning systems consist of water level sensing devices which are connected to an alarm that is activated by rising water levels. These systems provide some measure of added protection on the smaller, faster rising streams but have little, if any, value on large slow rising streams such as the Mississippi River where the normal slow rising nature of the stream provides adequate warning time.

NO ADDITIONAL FEDERAL ACTION

Taking no additional Federal action would neither solve the area's existing flood problems nor reduce existing flood damages. The implementation of existing Federal regulations enacted in the Federal Disaster Protection Act of 1973 will limit future development in the area, however, and will provide a basis for comparison of other proposals for flood protection.

DEVELOPMENT AND SCREENING OF ALTERNATIVE PLANS

NONSTRUCTURAL

Nonstructural measures evaluated for the area included zoning and building code regulations, floodproofing, and permanent evacuation. Other nonstructural measures such as flood warning systems, flood forecasting, flood fighting, and flood disaster assistance programs are already a part of the existing situation in the drainage district and were not evaluated further.

Zoning and building code regulations would limit possible future development in the area. However, if adequate structural protection is not provided, it is assumed that regulatory controls will be adopted.

Floodproofing was not considered practical. A majority of the industrial facilities could not be physically or structurally raised to an elevation greater than that provided by the existing levee protection. In addition, floodproofing would not provide increased protection for the rich farmland area which is expected to be in greater demand in the future. Permanent evacuation was not determined to be practical or acceptable since the area already receives some protection from the existing levee system and has no local support.

STRUCTURAL

Of the possible structural solutions, only improvement of the existing levee system or construction of new levees appears practical. Control of flows on the Mississippi River by a main stem reservoir is impractical

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because of upstream improvements in the flood plain. Control of major tributaries to the Mississippi is not possible because of economic, environmental, political, and terrain conditions.

Since the area is already protected to some degree by the existing levee system, improvement of that system seems to be a logical method of providing increased protection. This could be done in a variety of ways: providing additional fill on the crown and riverside slope, providing additional fill on the crown and landside slope, or providing a concrete floodwall on the top of the existing levee if there is not enough space to raise the levee with fill material.

Construction of a ring levee around the commercial-industrial area is also a means of providing increased protection for the area of the concentrated potential annual damages. This would divide the district in two.

There are a variety of advantages and disadvantages to all of the possible methods of improving the existing levee system. Primary environmental concerns expressed include avoiding damage to fish, wildlife, and aquatic habitat, and location of borrow areas. Social considerations associated with the study generally concern local acceptability of the available alternatives. Economic considerations include the costs and the benefits. The least cost alternative would involve using hydraulic fill dredged from the Mississippi and placed on the landside of the levees. However, while this plan is the least expensive, it would involve the loss of agricultural land for additional levee rights-of-way. Placing the fill on the river side of the levee would avoid the loss of agricultural land; however, this would involve stability problems and would require impervious material to be used rather than the hydraulic fill dredged from the river. This would significantly increase the cost and would also destroy the fish and wildlife habitat along the river.

PRESENTATION AND EVALUATION OF FINAL ARRAY OF PLANS

The final array of plans considered for the South Quincy Drainage and Levee District includes the No Additional Federal Action plan, the plan to construct a ring levee around the commercial-industrial complex in the northeast corner of the district, and the plan to raise the existing district levees in-place to protect the entire area. Flood plain evacuation and floodproofing were not considered further since they did not satisfy the specific study planning objective; however, other nonstructural measures or components are included in the final array of plans as a part of the No Additional Federal Action alternative.

"NO ADDITIONAL FEDERAL ACTION" ALTERNATIVE

The possibility that no additional Federal action be taken satisfies none of the area's flood control needs, but serves as a base condition for assessing and evaluating the effects of the other alternatives.

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Some nonstructural measures are now or are expected to be a part of the condition in the area. Flood warning, emergency flood control measures, temporary evacuation, and flood disaster relief programs are now being used to reduce the hazard and impact of floods. Since this alternative is the most implementable to any nonstructural plan, it is considered to be the "primarily nonstructural" plan.

If no additional Federal program is provided, it is assumed that regulatory controls of flood plain use and development would continue in the drainage district. The district is presently in the Emergency Phase of the flood insurance program. With no additional Federal program, the flood damage potential in the area would continue to increase if development increases. Average annual damages in the area are more than $3,000,000. These damages, along with costs of administering the flood insurance program and floodproofing new development, represent the cost to the Nation of the no additional Federal program alternative. With no additional Federal program, no significant change in natural areas and associated ecological systems is expected, other than natural eutrophication. This would tend to support the national goal to preserve and enhance existing natural areas.

With no additional Federal programs, agricultural land-use productivity would probably continue at current levels. However, with levee failure and inundation the crops would be lost for the year. Erosion, siltation, and damage to farmsteads may impact on productivity and efficiency for several years. Crop insurance is not available for the area, and farmers operating on credit who suffer a major crop loss may not be able to continue in business.

Commercial and industrial development is anticipated to continue without any additional flood protection. Flood insurance would reduce the impact of flood losses. However, based on experience in the 1973 flood, the interruption in business operations for periods of two months or more could result in the business failure of some enterprises.

Because the Mississippi River is relatively slow rising, and a flood forecasting system is used, there is not a great hazard to the people of the district. However, there is a potential hazard to health by waterborne pollutants and pathogenic agents, flooding of septic fields, and increased populations of disease-carrying insects in standing water areas. Another factor which would impact on social well-being with major floods is the emotional stress associated with natural disasters.

RING LEVEE

A ring levee to protect only the commercial-industrial area located in the northeast corner of the district was one of the candidate plans carried forward and studied in detail. The intent of this alternative was to provide protection to the highly valued industrial development in the area

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without modifying the entire levee system, and providing high level protection to agricultural land that has the potential to convert to industrial development. Executive Order 11988 states that the Federal Government will not participate in development in the Nation's flood plains.

The ring levee plan considered is shown on plate 2. The plan consisted of construction and modification of 3 miles of levees and concrete floodwalls. The levees would be built and improved using impervious clay fill obtained from borrow areas within the district. Other features of the plan would include road ramps, a railroad closure structure, ponding areas, seeding of the levees, and riprap slope protection where required. The total first cost of this plan for a 500-year level of protection was estimated at $10,905,000. The resulting average annual benefits and costs were estimated at $4,268,000 and $936,600, respectively. The benefit-to-cost ratio for the plan is 4.6.

The total first cost for the SPF level of protection is $17,851,000 with annual benefits and costs of $4,883,400 and $1,530,700, respectively. The benefit-to-cost ratio for the plan is 3.2.

RAISE EXISTING LEVEE SYSTEM

This plan involves raising approximately 9.2 miles of existing levee about 3.5 feet. The mainstem Mississippi River levee would be raised with hydraulic fill and the flank levees along Curtis and Mill Creeks would be raised with impervious material from remote borrow areas. The levee slopes would be seeded and riprapped where required. Concrete floodwalls would be used in the confined area of Curtis Creek. The line of protection from levee Station 20+00 to Station 41+00 would consist of providing a concrete cap on an existing transfer sewer. Associated features of the selected plan include raising and resurfacing existing road ramps, ramping of State Highway 57 at the Mill Creek flank levee crossing, a railroad closure structure at the Curtis Creek flank levee crossing, and modification of the discharge lines at the existing pumping plant. The plan is shown on plate 2. The total first cost of this plan was estimated at $9,889,000. The resulting average annual benefits and costs were estimated at $4,323,000 and $818,300, respectively. The benefit-to-cost ratio for this plan is 5.3. Since a 500-year level of protection maximizes net economic benefits, this plan is designated the National Economic Development (NED) Plan.

Raising the existing levee emphasizes net contributions to the environmental quality account. Impacts to the natural environment are minimal in view of the scope of the project. Hydraulic dredging in designated slough areas for landward levee expansion is expected to improve fishery habitat. The seeding of the sand levee slope with sand-tolerant grasses is considered a positive contribution to the environment of the area. This alternative is, therefore, designated as the environmental quality (EQ) plan.

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SELECTION OF THE FINAL PLAN

After the processes of problem identification, alternative formulation, input assessment, and alternative evaluation are completed, the alternative which is considered the most desirable is selected and recommended for implementation.

Plan selection is made by the District Engineer in the best public interest and is based upon public response to the plans. The crucial considerations involved in plan selection will be presented in a Record of Decision.

Plan recommendation requires two basic criteria be met: net economic and environmental benefits and implementation authority.

* A recommended plan, when considered individually on the basis of "with" vs. "without" comparison, must be justified in the sense that the total beneficial economic and environmental contributions exceed the total adverse contributions.

* The plan must be implementable within the authorities of the Chief of Engineers.

* The No Additional Federal Action" plan does not satisfy the planning objective of flood damage reduction for the South Quincy Drainage and Levee District and is not acceptable to the concerned public.

The ring levee plan, although economically and environmentally justified, would provide protection to a very small percentage of the district. Flood damage to the much larger agricultural sector of the district would continue. Implementation of this plan would split the drainage district into two factions: the protected and the unprotected. Before this plan could be recommended, a new legal entity would have to be formed to act as the project sponsor. The drainage district officials have indicated they would not be willing to sponsor a project that would not protect the entire district (see Appendix C, Pertinent Correspondence).

The plan to raise the existing levee system in place is economically and environmentally justified and would provide a high degree of protection to the entire district. The plan satisfies the planning objective for flood damage reduction and represents a program which would be acceptable to the majority of the concerned publics.

Detailed studies indicate that the structural alternative of raising the existing levees in place to provide protection from a flood having a 0.2 percent chance of occurring in any year (500-year) is the plan that would provide the greatest net benefits to the area. Protection to the Standard Project Flood (SPF) level is economically justified for this alternative and is the goal for project where damages would result in a catastrophe. While the South Quincy Drainage and Levee District does contain a significant damageable industrial base, it has a very small number of residential, public, and other urban facilities. The absence of these facilities

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substantially lessens the danger posed to human life should the levee be overtopped. The loss to the industrial base would be major at the SPF level; however, such damage would not be extensive enough to cripple the activities in the Quincy area nor would the loss be irreplaceable. Most damage would occur to machinery and the existing plant inventories of products and raw materials. Floods of the SPF magnitude are expected to involve ample forecast time to avoid a threat to loss of life and reduce much of the potential economic losses through flood warning, evacuation, and flood fighting techniques. For the aforementioned reasons, the South Quincy Drainage and Levee District is not considered to be an area where damages from an SPF level flood would result in a catastrophe. In view of the increased emphasis on greater local financial participation in flood control projects, and because of the magnitude of lands and rights-of-way required, the South Quincy Drainage and Levee District supports the 500-year level of protection in preference to the SPF level. Coordination with affected governmental and nongovernmental interests indicate support for improvement of the entire levee system (see appendix C). This alternative, affording 500-year protection, has been selected for recommendation.

SECTION 3 - DESCRIPTION OF THE SELECTED PLAN

Based on economic, environmental, and social considerations, the structural alternative of raising 9.2 miles of existing levees of the South Quincy Drainage and Levee District is the selected plan.

PLAN COMPONENTS

The selected plan involves raising approximately 9.2 miles of existing levee about 3.5 feet. The mainstem Mississippi River levee would be raised with hydraulic fill and the flank levees along Curtis and Mill Creeks would be raised with impervious material from adjacent borrow areas. Concrete floodwalls would be used in the confined area of Curtis Creek. The line of protection from levee Station 20+00 to Station 41+00 would consist of providing a concrete cap on an existing transfer sewer. Associated features of the selected plan include raising and resurfacing existing road ramps, ramping of State Highway 57 at the Mill Creek flank levee crossing, a railroad closure structure at the Curtis Creek flank levee crossing, and modification of the discharge lines at the existing pumping plant. The selected plan is shown on plate 2. The levees would be seeded and riprapped as shown on the typical sections on plate 3.

DESIGN AND CONSTRUCTION CONSIDERATIONS

The selected plan would provide protection to the area from floods having a 0.2 percent chance of being equalled or exceeded in any year (500-year frequency).

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The mainstem levees would be raised about 3.5 feet with hydraulic sandfill obtained from selected backwater slough areas of the Mississippi River. The fill would be placed on the crown and landward slope of the existing levee. The present slope (1V on 5H) would be maintained, increasing the levee base width by an average of 34 feet. The crown width of the improved section would be 12 feet. The levee slopes would be seeded with sand-tolerant species of grasses, except in those areas of the riverward slope that would be riprapped for protection against wave and current action. Existing berms would be raised and lengthened to provide stability for the additional levee height.

The flank levees along Curtis and Mill Creeks would be raised with semi-compacted clay fill obtained from borrow areas along Mill Creek or on the bluff east of Highway 57. The clay fill would be placed on the crown and primarily on the landward slope of the existing levee. The present slopes (1V on 3H) or (1V on 4H) would be maintained. The levee base widths would be increased by 25 to 30 feet. The crown width of the improved semicompacted section would also be 12 feet. The levee slopes would be seeded except where riprap is required for slope protection from wave and current action. Existing berms would be raised and lengthened to provide stability for the additional levee height.

As shown on the general plan (plate 2) and in the typical sections (plate 3), there are areas along Curtis Creek where the line of protection would consist of concrete floodwalls. Existing floodwalls along Curtis Creek between the Burlington Northern Railroad tracks and Highway 57 would be raised by placement of a new concrete wall creekward of the existing wall. An existing I-Wall between stations 1+06 and 6+12 would be raised by adding new concrete to the landward face of the wall. Between stations -4+15 and -10+45, a new concrete I-Wall would be constructed. Between stations 20+00 and 41+00, a concrete cap would be added to an existing wall on top of a transfer sewer.

An 18-inch thickness of riprap would be added to the improved levee section in those reaches that are presently riprapped.

Construction materials for the proposed improvement are available in the immediate area. Borrow material for the mainstem and flank levees is available as indicated in the preceeding paragraphs. The use of borrow sites to provide clay material for the flank levees and hydraulic sand for the mainstem levee is not expected to significantly deplete these resources or preclude their future development in the district.

An analysis of the existing pumping plant in the district indicates that its capacity is adequate and suitable for economic operation of the project. The system of drainage ditches and culverts in the district is adequate to convey the interior drainage to the pumping plant. The pumping plant discharge lines would be modified as part of the project to extend over the improved levee section. Details of the interior drainage analysis can be found in appendix A of this report.

Relocations of power and telephone lines and local roads affected by the project are a local interest responsibility and are included in the project as a non-Federal expense. Relocations would be coordinated with construction of the project.

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The additional levee right-of-way would require about 55 acres. It is on the landward side of the existing levee with varying widths from a few feet up to a maximum of about 65 feet and extending along Curtis Creek, the Mississippi River, and Mill Creek. A majority of this land is presently used for production of corn and beans. No buildings are located on the additional right-of-way land.

About 3 years would be required to raise the levee and construct associated features. During construction, protective measures would be enforced to insure that erosion, dust control, and debris disposal methods would be used to minimize adverse impacts of the construction activities.

OPERATION AND MAINTENANCE CONSIDERATIONS

Operation and maintenance of the proposed project would be the responsibility of the South Quincy Drainage and Levee District. The operation and maintenance of the project would be limited to the upkeep of the levee slopes, appurtenant structures, and the existing pumping plant. Annual costs for operation and maintenance are estimated at $4,600.

PLAN ACCOMPLISHMENTS

The primary accomplishment of this plan is that it achieves the specific planning objective to provide an economically and environmentally sound and socially acceptable method of flood damage reduction for the South Quincy Drainage and Levee District. The plan also provides an opportunity for enhancement of the fisheries habitat in the Mississippi River backwater sloughs by dredging for levee fill material.

The levees would protect the South Quincy Drainage and Levee District from coincident floods on the Mississippi River, Curtis Creek, and Lost Creek having a 0.2 percent chance of occurring in any year (500-year frequency). It would allow nominal freeboard of 4 feet at the upstream end of the project and 3 feet at the downstream end. Reduction of the flood damages to existing improvements would be the major benefit of the project. Based on conditions over the economic life of the project, average annual damage is estimated at $637,900 with the project and $4,797,300 without the project.

In addition to economic benefits of the project, there would be intangible benefits associated with the well-being of the inhabitants of the area because of the added security resulting from the project.

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ECONOMIC, ENVIRONMENTAL, AND OTHER SOCIAL EFFECTS

ECONOMIC

Economic evaluation of the selected plan costs, benefits, and damages were developed and analyzed. An economic analysis is made to determine whether there is economic justification for Federal participation in a proposed plan of improvement. The degree of justification is determined by comparing estimates of average annual costs with an estimate of average annual benefits.

Costs include an estimate of the value of goods and services used to construct, operate, and maintain the project. Benefits involve estimates of flood damages prevented and other values created.

Damages are developed from information collected from surveys and personal interviews. Based on October 1981 prices and conditions, average annual damage in the South Quincy Drainage and Levee District totals $3,326,800. Under future conditions, considering expansion of existing industrial facilities, modernization of production facilities, new industries, and increase in crop yields, and using current prices, the equivalent average annual damage is estimated to be $4,962,800.

Cost estimates for the selected plan include costs for engineering, design, supervision, and administration and a 25-percent contingency factor. The period of analysis for the plan was selected as 100 years. Interest and amortization charges are based on an interest rate of 7-5/8 percent. The estimated first costs of the selected plan are summarized in table 1. Annual costs are summarized in table 2.

TABLE 1

Summary of First Costs

Item	Amount	
	Federal	Non-Federal
Lands and Damages		$260,000
Relocations	$ 13,000	32,000
Levees and Floodwalls	7,856,700	
Drainage Facilities	109,000	
Pumping Plants	86,400	
TOTAL CONTRACT COST	$ 8,065,200	$292,000
Engineering and Design	927,500	-
Supervision and Administration	604,300	-
TOTAL FIRST COSTS	$ 9,597,000	$292,000

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TABLE 2

Summary of Annual Costs

Estimated First Cost	$ 9,597,000	$292,000
Interest During Construction	752,600	23,300
TOTAL	$10,349,600	$315,300
Capital Recovery Factor (0.076299)	$ 789,643	$ 24,057
Levee Maintenance 9.2 mi. @ $500/mi		4,600
TOTAL ANNUAL CHARGES	$ 789,643	$ 28,657
TOTAL FEDERAL AND NON-FEDERAL ANNUAL CHARGES		$818,300

Flood damage reduction is the primary benefit that would result from construction of the selected plan. This benefit was estimated by comparing damages with the existing levee against damages with the improved levee. Based on existing conditions, benefits total $2,894,500, and the benefit-to-cost ratio is 3.5. Considering future conditions, the total annual benefit estimate is $4,323,000 and a comparison of benefits to cost, based on current prices, results in a benefit-to-cost ratio of 5.3.

ENVIRONMENTAL

The selected plan involves raising the existing levees in place and, consequently, would have limited new effects on the flora and fauna of the area. In general, there will be little change to the conditions brought about by the raising of the existing levee.

About 55 acres of land will be required for rights-of-way. Of this total, 47 acres are in cropland and 8 acres are in natural or seminatural condition. The natural resource value of these 8 acres would be lost. This loss would be offset by grading and seeding a 5-acre borrow site along Mill Creek to encourage wetland development and by seeding the mainstem levee with sand-tolerant species of grasses.

Selected dredging in the backwater slough areas of the Mississippi River to obtain sand for the levee raise would improve the fisheries habitat for the area.

During construction, levels of air, water, and noise pollution would increase; however, these effects would be temporary and would cease after construction is completed.

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The selected plan is in compliance with Executive Order 11990, concerning the protection of wetlands. Impacts to wetlands and mitigation efforts considered are discussed in detail in section 4 of the Environmental Impact Statement.

EXECUTIVE ORDER 11988

The selected plan is considered to be compatible with Executive Order 11988. While the potential flood plain development in the South Quincy District is expected to be significant, only 4 percent of that growth can be attributed to location of new commercial/industrial facilities resulting from an increased level of flood protection. The magnitude of this induced growth is minimal and is not considered a violation of the principles of the executive order. Any new industrial expansion is expected to be in the vicinity of the existing industrial complex. The vast majority of the future growth will occur from existing industries through capital expenditures on technologically advanced equipment or expansion of current plant capacities and facilities. This growth is expected to occur for the "without project" condition as well as under the proposed project and would not impact on remaining natural surface waters and forested areas contained in the district. Without the project improvement, it is expected that industry would seek and be granted variances to floodproofing any new construction in order to keep operations economically viable and compatible with existing facilities.

Residential development has not occurred in the flood plain. This can be attributed to the availability of practicable and more desirable alternatives for residential development in the city of Quincy. Attractive alternatives also exist within the city for commercial and non-water dependent industrial expansion. The South Quincy Drainage and Levee District is located in Adams County, Illinois, which is currently enrolled in the emergency program phase of the National Flood Insurance Program.

OTHER SOCIAL EFFECTS

A variety of other effects would result from implementation of the selected plan. Residential, industrial, agricultural, and public property would be protected by the plan. Agricultural and industrial productivity would be increased. The threat of interruption of public services and utilities would be significantly reduced. Rail and highway traffic would no longer be impaired. Increased safety, social stability, and welfare would also result for the residents of the area. Increased health benefits would also occur from the reduction of the threat of inundated septic tank fields. Property values and tax revenues could be expected to increase. Identification of historic and significant archaeological sites may help to promote their preservation.

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The selected plan is compatible with the neighboring levee systems in the area. These neighboring levee districts are federally constructed projects designed and built to the same level as the existing project at South Quincy. While raising the South Quincy Drainage and Levee District would provide additional protection for that district, it would not reduce the existing protection of other levee systems since all project design profiles were developed using confined river conditions. Confinement assumes that all protected areas have levees of infinite height which will not fail at any frequency. This condition, therefore, results in river stages that represent a worst case condition.

SECTION 4 - PLAN IMPLEMENTATION

INSTITUTIONAL REQUIREMENTS

Before construction of the selected plan, several steps must be completed.

- Review of final report and Final EIS by higher Corps authorities and Federal and State officials.

- After review by the Chief of Engineers, and the Office of Management and Budget, the Secretary of the Army forwards the report to Congress for authorization and subsequent funding.

- After funding is initiated, detailed design plans, specifications, and an engineering estimate are prepared by the District Engineer. Bids are then solicited and a construction contract awarded. Local action is implemented during this same time.

- Following construction of the project, local interests assume responsibility for operation and maintenance.

IMPLEMENTATION RESPONSIBILITIES

Federal and non-Federal responsibilities and cost apportionment policies concerning construction and operation and maintenance for federally constructed projects have been set out by existing legislative and administrative guidance.

This section presents the pertinent information regarding the cost apportionment and Federal and non-Federal responsibilities involved in the improvement of the levee system in South Quincy Drainage and Levee District.

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FEDERAL RESPONSIBILITIES

The Federal Government will design and construct the various features of the protection works. The work generally charged as a Federal cost includes that for levees, floodwalls, ramps, and utility lines through, over, or beneath levees and floodwalls. The total Federal first cost is estimated to be $9,597,000 based on traditional cost-sharing legislation.

General legislation authorizing implementation of water resource projects, the most recent being the Water Resources Development Act of 1976, generally contained local cooperation requirements established by enactment of various laws. The report contains information based upon application of these traditional requirements.

The Administration is reviewing project cost-sharing and financing across the entire spectrum of water resource development functions and has submitted proposed legislation to Congress for navigation projects. The basic principle governing the development of specific cost-sharing policies is that whenever possible the cost of services produced by water projects should be paid for by their direct beneficiaries. It also is recognized that the Federal Government can no longer bear the major portion of the financing of water projects. New sources of project financing, both public and private, will have to be found.

While specific policies applicable for the South Quincy Drainage and Levee District project have not yet been established, non-Federal interests can expect that, under the Administration's financing and cost-sharing principles, the level of their financial participation will need to be significantly greater than in the past.

NON-FEDERAL RESPONSIBILITIES

The selected plan is the 500-year levee. Under this plan a permanent easement will be acquired for 39 acres for levee and 13 acres for berm. Of the 52 acres studied, about 45 is estimated to be cropland. Temporary easements for 19 acres of borrow area will also be acquired. The estimate of $260,000 includes lands, improvements, damages, contingencies, and costs of acquisition.

Officials of the sponsoring agency for this project, the South Quincy Drainage and Levee District, would be required prior to the start of construction, and in accordance with Section 221 of the Flood Control Act of 1970, Public Law 91-611, to enter into a written agreement that they will:

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction and subsequent maintenance of the project. Current estimate, $260,000.

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b. Hold and save the United States free from all damages arising from the construction and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors.

c. Maintain and operate the works, including beautification and mitigation measures, after completion, in accordance with regulations prescribed by the Secretary of the Army. Current estimate, $4,600.

d. Make all relocations and alterations of buildings, utilities (except the parts of utilities that pass over, through, or under the protective works), roads, and other facilities except railroad bridges, ramps, and approaches thereto, where necessary in the construction of the project. Current estimate, $32,000.

e. Prevent encroachment on any of the flood protection structures, including the ponding areas, and if ponding areas are impaired, provide substitute storage capacity or equivalent pumping capacity promptly without cost to the United States.

f. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved 2 January 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent maintenance of the project and inform affected persons of the pertinent benefits, policies, and procedures in connection with said act.

g. Publicize flood plain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to insure compatibility between future development and protection levels provided by the project.

h. At least annually, notify persons in the affected area that the project will not provide complete protection.

i. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (P.L. 88-351) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, in connection with the maintenance and operation of the project.

The Section 221 agreement will also grant the Government a right to enter, at reasonable times and in a reasonable manner, upon lands which the Drainage District owns or controls for access to the project, for the purpose of inspection, and for the purpose of completing, operating, repairing, and maintaining the project, if such inspection shows that the Drainage District, for any reason, is failing to complete, repair, and maintain the project in accordance with its assurances and has persisted in such failure after a reasonable notice in writing by the Government. No completion, operation, repair, or maintenance by the Government in such event shall operate to relieve the Drainage District of responsibility to meet its obligation as set forth in the Agreement or to preclude the Government from pursuing any other remedy at law or equity.

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PUBLIC VIEWS

VIEWS OF FEDERAL AGENCIES

The draft report and EIS has been furnished to pertinent Federal agencies for their review. Letters received from those agencies expressing views and recommendations are contained in Appendix C, Pertinent Correspondence.

VIEWS OF NON-FEDERAL AGENCIES AND OTHERS

The alternative plans of improvement were coordinated with officials of the South Quincy Drainage and Levee District and with interested local and State agencies. Two public meetings have been held to obtain views and comments from local interests. Preliminary support of a plan to raise the existing levee was expressed by officials of the drainage district. Letters and comments received are contained in appendix C.

SECTION 5 - SUMMARY OF COORDINATION, PUBLIC VIEWS AND COMMENTS

Coordination of the study effort was maintained with Federal and State agencies, local governmental units, interested groups, and the general public throughout the study period. The public involvement program consisted of public meetings and distribution of reports, brochures, and newsletters to obtain input from the concerned interests.

An initial public meeting was held in June 1971, to explain the objective of the study and to receive input regarding the problems and needs in the study area. The meeting served basically as a means of information exchange with the public and as a mode to establish the study direction.

An alternative public meeting was held on 20 December 1976, at the city hall in Quincy, Illinois. The purpose of the meeting was to discuss the alternative flood damage reduction studies made, and to obtain the views and comments of the affected interests. Approximately 35 persons representing Federal, State, and local agencies and interested individuals attended the meeting. Based on input received as a result of the alternatives public meeting, it was apparent that the most practical and socially acceptable alternatives were those which involve raising all of the levees in the South Quincy Drainage and Levee District.

An analysis of alternatives and their impacts on fish and wildlife resources was completed in July 1981, by the Fish and Wildlife Service, US Department of the Interior. The agency expressed a first preference for flood plain evacuation or no Federal action. A third preference was the construction of a levee around the industrial subarea of the district.

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The fourth preferred alternative was raising the existing agricultural levee with sand borrow. Strongly discouraged was the final alternative of raising the existing agricultural levee with clay borrow due to the loss of 50 acres of bottom land hardwoods. The complete report along with other documentation of views and comments are included in Appendic C - Pertinent Correspondence.

SECTION 6 - ENVIRONMENTAL ANALYSIS

The selected plan would utilize sand borrow from the Mississippi River backwater areas to raise the existing levee in the landward direction. The base of the levee would be extended to a maximum of 50 feet and would occupy about 55 acres. The additional expansion would be into agriculturally used land with the exception of 2 points totaling approximately 8 acres in which forested and wetland areas would be impacted.

In the upper end of the Curtis Creek flank protection, existing concrete floodwalls would be raised or new floodwalls constructed. The construction of new floodwalls would be set back far enough so as not to encroach upon the creek. The impacts of the proposed plan to Curtis Creek and the surrounding terrestrial area are not considered significant.

The levee along Hill Creek at the south end of the district will be raised for a distance of 5,000 feet using clay fill. A majority of the levee expansion will be generally in the landward direction; however, there are areas where the upgrade will be toward the creek to avoid existing structures. The expansion will require about 5 acres of which a majority is agricultural land. Construction of the proposed project will produce some turbidity and sedimentation impacts on Hill Creek from overland runoff until the surrounding landscape becomes stabilized with vegetation.

The bald eagle is the only federally listed endangered species reported in the project area. Construction activities would come as close as 250 feet from the area used by the eagles. Disturbance to the eagles is considered to be minimal and temporary.

Archaeological reconnaissance surveys conducted along the potential zone of construction concluded that the project will have no affect on historic, architectural, or archaeological sites in the area.

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SECTION 7 - RECOMMENDATION

I recommend that the selected plan, which would modify the existing South Quincy Drainage and Levee District project to provide a 500-year level of protection from flooding on the Mississippi River and Curtis and Mill Creeks, be authorized for construction with such modifications as, in the discretion of the Chief of Engineers, may be advisable.

The plan extends for 9.2 miles and would raise the existing line of protection approximately 3.5 feet. The project would produce net annual benefits of $3,505,000 and has a benefit-to-cost ratio of 5.3 to 1.0, based on a 100-year economic life and a discount rate of 7-5/8 percent. The estimated total first cost of the project is $9,889,000.

General legislation authorizing implementation of water resource projects, the most recent being the Water Resources Development Act of 1976, generally contains local cooperation requirements established by enactment of various laws. This report contains information based upon application of these traditional requirements.

The Administration is reviewing project cost-sharing and financing across the entire spectrum of water resource development functions and has submitted proposed legislation to Congress for navigation projects. The basic principle governing the development of specific cost-sharing policies is that whenever possible the cost of services produced by water projects should be paid for by their direct beneficiaries. It is also recognized that the Federal Government can no longer bear the major portion of the financing of water projects. New sources of project financing, both public and private, will have to be found.

While specific policies applicable for the South Quincy Drainage and Levee District project have not yet been established, non-Federal interests can expect that, under the Administration's financing and cost-sharing principles, the level of their financial participation will need to be significantly greater than in the past. Accordingly, I also recommend authorization to construct and to otherwise implement the project subject to cost-sharing and financing arrangements which are satisfactory to the President and Congress.

BERNARD P. SLOFER
Colonel, Corps of Engineers
Commanding

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[First endorsement]

NCDPD-PF (June 1982)
SUBJECT: Mississippi River Coon Rapids Dam to Ohio River, Feasibility Study for Flood Damage Reduction, South Quincy Drainage and Levee District, Illinois, Interim Report No. 3

DA, North Central Division, Corps of Engineers, 536 South Clark Street, Chicago, Illinois 60605 29 OCT 1982

TO: Cdr, USACE (DAEN-CWP-C), WASH, D. C. 20314

I concur in the analysis and recommendations of the District Engineer, and further recommend that construction authorization of raising the existing South Quincy levee be subject to any cost sharing and financing arrangements with responsible non-Federal entities which are satisfactory to the President and the Congress.

Scott B. Smith
SCOTT B. SMITH
Brigadier General, USA
Commanding

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ECONOMICS

APPENDIX B

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MISSISSIPPI RIVER
COON RAPIDS DAM TO OHIO RIVER
FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION
SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
ILLINOIS
INTERIM REPORT NO. 3

APPENDIX B - ECONOMICS

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MISSISSIPPI RIVER
COON RAPIDS DAM TO OHIO RIVER
FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION
SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
ILLINOIS
INTERIM REPORT NO. 3

APPENDIX B - ECONOMICS

SECTION 1 - INTRODUCTION

This appendix summarizes the types of flood damages that were analyzed and the methodologies used to arrive at the potential benefits for each of the flood damage reduction alternatives. The purpose of this type of economic analysis is to serve as a screening criterion for alternative plans. Guidelines for the analysis are current state-of-the-art practices, Corps of Engineers regulations, and the Water Resources Council's procedures for evaluation of national economic development benefits and costs in water resources planning.

SECTION 2 - EXISTING FLOOD DAMAGE

The primary purpose of an economic analysis is to evaluate economic feasibility of a proposed project. A project's degree of justification can be determined by comparing the equivalent annual costs with an estimate of the equivalent average annual benefits that would be realized over the life of the project.

Benefits for any flood damage reduction project occur from the actual reduction in physical damage to existing property, from reducing future damage to property not yet located in the flood plain, through savings in emergency floodfighting expenses and flood insurance expenses, and through the increase in value to those lands protected from flooding by a project. The three main categories of physical damage within the study area are:

* Agricultural
* Industrial/Commercial
* Residential

Each of these damage categories is discussed and the methodology used to evaluate each category is described in the following subsections.

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AGRICULTURAL FLOOD DAMAGES

Agricultural damages are a function of the type of crop grown, the duration and depth of inundation of planted acres, the time of year the flood event occurs, the frequency of flooding, and the number of acres affected.

Information concerning the type of crops grown in the study area was obtained from the Soil Conservation Service, the Agricultural Stabilization and Conservation Service, and from direct farm interviews. The information from multiple sources was used to determine average crop yields, production budgets, and potential flood damages. Of a total 5,800 acres in South Quincy, 3,800 acres are devoted to crops. Corn and soybeans account for about 95 percent of the total cropland in the study area and are grown in nearly equal acreages. There are also other minor crops such as wheat, oats, and milo, which make up about 5 percent of total crop acres. These percentages have been reassigned evenly to the two main crops.

Duration and depth of inundation of planted acres are the two main factors to be considered when assessing yield reduction damages. Progressively longer and deeper periods of inundation result in increasingly greater damage to crops. However, in the study area any flooding that overtops the existing protective levees results in complete loss of planted crops, of applied fertilizers and chemicals, and of completed field work.

In order to assess the potential flood damage to the agricultural lands of the study area, a damage figure was assigned to each acre in the flood plain. This damage figure was developed using a monthly production budget as shown in table B-1. The gross cash yield per acre was determined from the expected yield in bushels per acre multiplied by the normalized price per bushel and is shown on table B-3.

A flow value of 277,000 ft^3/s (approximately a 10-year flood) and a corresponding gage height value of 22.4 feet on the Quincy gage were used to determine the historical probability of flooding in separate half-month (15 or 16-day) periods of time. Each month was divided into half-month time periods, A or B, and the probability of a flood occurring in that half-month time period was based on the frequency with which 10-year or greater floods have historically occurred in that time period. Table B-3 provides the percent chance of occurrence of a flood event in each month period based on the period of record. It should be noted that major flood events on the Mississippi River occur between the first part of March and the last half of July. These percentages were then used as the historical probability factors and multiplied by the sum of the duplicated expenditures for that period plus the reduction in gross cash yield less the unincurred production costs, to produce a half-month weighted damage value. The sum of these monthly damages were then used for the yearly damage value sustained per acre.

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TABLE B-1

Typical Variable/Cost Per Acre ($)
Production Budget for Corn - 1981

Month	Jan-Mar	Apr	May	Jun	Jul	Aug-Oct	Nov	Dec	Total
Seed	$ 0.0	$ 0.0	$13.50	$0.0	$0.0	$ 0.0	$0.0	$0.0	$13.50
Fertilizers	0.0	4.00	30.50	10.50	0.0	0.0	0.0	0.0	45.00
Crop Chemicals	0.0	6.91	6.91	1.84	1.84	0.0	0.0	0.0	17.50
Mach. Opera. & Hire	.93	2.74	4.84	3.26	1.61	.93	19.40	1.79	35.50
Miscellaneous	3.12	1.04	1.04	1.04	1.04	3.12	1.06	1.04	12.50
Operating Interest	1.88	.62	.63	.62	.63	1.87	.63	.62	7.50
TOTAL VARIABLE COSTS**	$ 5.93	$15.31	$57.42	$17.26	$5.12	$5.92	$21.09	$3.45	$131.50

* Estimated yield - 110 bushels per acre.

** Variable Costs do not include machinery depreciation and interest ($35.00), real estate taxes, depreciation, and interest ($84.00), or labor cost/acre ($22.00). The total estimated cost/acre for corn is $272.50.

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The following assumptions were made in order to estimate the damage to crop during each half-month period:

a. Floods occur at the end of each time period.

b. Only one flood occurrence per year.

c. When a flood occurs, it takes 30 to 45 days to drain the levee district and delays planting at least that length of time.

d. Zero damage is sustained in January, February, March-A (i.e., the first half of March) or December floods.

e. A flood in March-B delays planting with negligible yield reduction. Disking costs are reincurred.

f. April-A flood delays planting until late May. Yield reduction of 15 percent and additional costs for 20 percent crop chemicals, 50 percent lime, their application, and redisk.

g. April-B flood delays plant to June. Yield reduction of 30 percent and added costs of 39 percent crop chemicals, lime, their application, and redisk.

h. May-A flood delays plant until mid/late June. Yield reduction of 46 percent and added cost of 60 percent crop chemicals, lime, 50 percent other fertilizers, seed, their application, and redisk.

i. May-B flood delays plant to July. Yield reduction of 56 percent and added cost of 79 percent crop chemicals, 50 percent nitrogen, all other fertilizers, seed, their application, and redisk.

j. June, July, August, September, and October floods result in total crop loss with saved harvesting costs.

Separate assumptions based on differences in planting dates and methods were made for each crop. The relationship of planting date delay to yield reduction is shown for each crop in table B-2.

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TABLE B-2

Yield Reduction [1/]

Planting Date	Corn	Beans
May 1	0%	0%
May 15	15%	8%
June 1	30%	20%
June 15	48%	35%
July 1	56%	46%
July 15	100%	100%

This information was used to calculate separate weighted field damage values for each crop in each time period. These calculations and the total composite value are shown in table B-3. The composite value of $167.20 per acre was based on the average of the sum of the monthly weighted damages for each crop. The product of the number of acres in agricultural production for each study area and the composite value will yield the expected agricultural flood damages for each flood event that overtops the existing levees. For the South Quincy Drainage and Levee District it would total $635,400.

1/ "Flooding versus crop damage," Doane Agricultural Service, Inc., St. Louis, Missouri September 10, 1976

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TABLE B-3

Weighted Field Damage Values by Crop Type ($)

Corn - Potential Damageable Value = 120 bu/acre (yield) x 2.78 $/bu (avg-price) = 333.60 $/acre

Time Period	Mar-B	Apr-A	Apr-B	May-A	May-B	Jun-A	Jun-B	Jul-A
Yield Reduction Damage ($)	0.0	50.04	100.08	160.13	186.82	333.60	333.60	333.60
+Replant Expense ($)	+ .38	+ 8.04	+15.69	+ 51.13	+ 83.61	+ 0.0	+ 0.0	+ 0.0
-Production Cost Saved ($)	- 0.0	- 0.0	- 0.0	- 0.0	- 0.0	- 36.53	- 28.00	- 25.44
=Total Corn Damage ($)	= .38	=58.08	=115.77	=211.26	=270.43	=296.97	=305.60	=308.16
xFlood Probability	x11.75%	x11.75%	x 23.50%	x 11.75%	x 6.0%	x 11.75%	x 17.5%	x 6.0%
=Weighted Field Damage Value for Corn	.04	6.82	27.20	24.82	16.22	34.89	53.48	18.49

Soybeans - Potential Damageable Value = 42 bu/acre (yield) x 6.93 $/bu (avg price) = 291.06 $/acre

Time Period	Mar-B	Apr-A	Apr-B	May-A	May-B	Jun-A	Jun-B	Jul-A
Yield Reduction Damage	0.0	23.28	58.21	101.87	291.06	291.06	291.06	291.06
+Replant Expense	.38	10.60	13.97	39.07	0.0	0.0	0.0	0.0
-Production Cost Saved	0.0	0.0	0.0	0.0	15.27	13.51	11.74	10.04
=Total Bean Damage	.38	33.88	72.18	140.94	275.79	277.55	279.32	281.02
xFlood Probability	11.75%	11.75%	23.5%	11.75%	6.0%	11.75%	17.5%	6.0%
=Weighted Field Damage Value for Beans	.04	3.98	16.96	16.56	16.54	32.61	48.88	16.86

	Corn	Beans	Average
Total Weighted Field Damage Value for Year	$181.96	$152.43	per/acre $167.20

40

INDUSTRIAL/COMMERCIAL FLOOD DAMAGES

This is the largest of all damage categories throughout the study area. Each industrial and commercial establishment was interviewed to determine potential flood damage losses to inventory, equipment and buildings, lost production, and cleanup costs. Elevation-damage curves were derived for each establishment based upon the physical value of the structure and inventory, elevation within the structure of inventory and machinery, and individual employment characteristics of the business. These elevation-damage curves were then combined with the elevation-frequency curves to develop frequency-damage curves and to calculate average annual damages. Plate B-1 is the form used in interviewing each business and provides a summary of the data gathered for all firms within the study area.

Business losses were estimated for each large firm based on the expected lost production time for each facility and the average daily profitability of that firm. For those firms where losses could be recouped at a later time, the business losses were not included in the flood damage assessment. However, because of the unique nature of the major industries, most business losses cannot be regained, and are considered economic losses. These business losses total about 0.6 percent of the industrial/commercial damages and are included in that damage category on table B-10.

There are several unique conditions in the South Quincy Drainage and Levee District that make the area susceptible to extensive flood damages. Primarily, the major damage would occur to machinery and inventory. One facility, Underground Public Warehouse, utilizes limestone mines to store warehouse inventory. Because all of the property is below ground level, a flood would cause total property loss. In addition, a flooding of this facility would mean that all floodwaters would have to be pumped out over an extended period.

A second major industry in the flood plain is Quincy Soybean. This facility maintains large inventories of soybeans, which become contaminated and lost when the levee is overtopped. This company also incurs equipment losses. Another large industry is Gardner-Denver, a maker of industrial pumps and compressors. Gardner-Denver employs over 1,300 people in its plants on both the north and south sides of Curtis Creek. Their primary flood damage is to specialized manufacturing equipment.

Industrial/commercial damages are concentrated in the northeast corner of the district. The ring levee alternative would protect this area only. In the following tables, the ring levee alternative would protect only that area identified as "South Quincy Industrial" area which is a subpart of the entire South Quincy District.

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RESIDENTIAL/PUBLIC DAMAGES

This is the smallest flood damage category in the study area. For residential damages, market values were established for each residence affected by flooding, based on a gross appraisal of the area and reasonably typical market values completed by an experienced appraiser. The contents of each home were assumed to equal 33 percent of the structure's value based on historical data and sample interviews. Standardized depth-damage curves were then used with elevation-frequency curves to develop frequency-damage curves and to calculate average annual damages.

Table B-4 shows the total value of property within the study area, as well as estimates of property damages for various flood events. The value presented for the 1973 flood, is the damage that would have occurred if the levee had failed. However, a flood-fighting effort, use of the entire freeboard zone, timely failure of the levee opposite South Quincy, and a short flood crest duration helped to prevent the levee from overtopping. From table B-4 it can be seen that the total property value of the Drainage District approaches $315 million, and that almost 75 percent of this is susceptible to flood damage. The flood damage is not concentrated in any one industry or firm. Geographically, it is concentrated in the northeast corner of the district and along Illinois Highway 57.

TABLE B-4

Total Value of Property and Potential Flood Damages
($1,000's)

	South Quincy Drainage District	South Quincy Industrial
Total Value of Property		
Industrial/Commercial	312,801	308,298
Residential	1,006	90
Agricultural Crop at Harvest Time	1,186.8	0
Damages Expected at Each Flood Event		
100-Year	154,564	152,827
200-Year	180,525	177,117
500-Year	201,731	196,414
SPF	238,764	218,730
1973 Flood if Levee had been overtopped	164,343	161,980

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AVERAGE ANNUAL FLOOD DAMAGES

Flood damage to an individual structure, group of structures, or other damage categories can be estimated by determining the dollar value of flood damage for different depths of flooding and by estimating the percent chance of exceedence of each flood depth. For a single flood event, of known depth, the damage caused by that event is estimated directly from a depth-damage relationship. When it is desired to compute the average damage which can be expected per year, then the damage corresponding to each depth of flooding is weighted by the percent chance of each depth occurring (damage caused by rare events is weighted less). The sum of the weighted damage represents the expected annual flood damage.

If the damage and frequency relationships remain unchanged each year, then the expected annual value represents the damage which can be expected to occur during any one year. However, either one or more relationships are likely to change over time; therefore, the expected annual value will also change. This results in a non-uniform annual distribution of expected values over time. To compare the magnitude of damage of alternative plans or to compare damage with costs, an equivalent annual value is computed. This equivalent value represents a uniform distribution (the same each year) of annual values and is computed by discounting and amortizing each year's expected annual damage value over a period of analysis. The discounting and amortization takes into account the time value associated with damage values.

For example, from table E-4, the expected damage from a flood at harvest time would cause agricultural damage of $1,186,800. The historical flood pattern on the Mississippi River has established that most floods occur in the late spring and the expected agricultural damage for each flood overtopping the levee would be $635,400. The existing levee provides protection for those floods having a 2 percent or less chance of occurrence, giving an expected annual agricultural damage of $14,900. However, yields for crops are expected to increase at a rate of 1 percent per year for the next 20 years changing the damage-frequency relationship over time and yielding an equivalent annual agricultural damage value of $16,900.

THE 500-YEAR FLOOD EVENT

The 500-year flood event would be a flood of catastrophic proportions, not only to the South Quincy Levee District, but to all of the Upper Mississippi River Valley. Virtually every levee within the valley would be overtopped, and the South Quincy Levee District levee would be overtopped by about 3 feet, and would exceed the current design flood height by 5 feet or more.

This flood, and all floods which would overtop the levee, can be expected to inundate the entire district with depths of up to 25 to 30 feet. Most of the industrial facilities would be inundated with from 8 to 18 feet of

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water. The typically long duration of a Mississippi River flood, and the problem of draining the Levee District after the levee is overtopped, would cause significant damages over and above those associated with a shorter duration event. The potential for damage from wave action, with total destruction of many facilities would increase significantly.

Much of the industrial equipment which might be cleanable with a short duration event, would be damaged more severely. In addition, the tremendous value of foodstuffs is totally lost during a flood. Industries could be expected to be shut down for up to 90 days, with little or no possibility of recouping the lost business.

Flooding of the entire district would affect 3,800 acres of cropland, 165 acres of industrial land, 14 commercial/industrial firms, 68 residences (not all of which are permanent), Illinois Highway 57, and many of the people living in Quincy, but employed in the flood plain. Damages can be expected to exceed $200 million in the study area alone. Essential services within the district would be disrupted; however, power generation hospital, and fire emergency services, etc., are all centered in Quincy and would not be of concern in the district proper.

SECTION 3 - OTHER POTENTIAL FLOOD DAMAGES

FUTURE GROWTH IN THE FLOOD PLAIN

Investment by commercial and industrial firms in the flood plain was evaluated for the next 20-year period. It was determined that this was the most appropriate planning horizon, and that investments made after year 20 could not be reasonably estimated. Investment trends were established based upon historical investment, interviews with companies located in the flood plain, elected public officials, local business development groups, local and regional planning commissions, and through reviews of regional development trends and potentials.

The flood plain study area differs from the Quincy area in general, in that it shows its own development trends. Therefore, the use of such data as population projections and OBERS projections were initially used only as guidelines. The 1980 census data were used as a check on 1977 Illinois Bureau of Budget population projections and the 1972 OBERS Series E projections for counties and for larger economic areas. Table B-5 provides the population projections referenced above for Adams and Marion County and a more conservative projection developed by the Rock Island District. The Rock Island District projection is an extension of the 1970-1980 increase which, based upon changes from 1950-1980, is more reasonable than either the decreases or larger increases of the other two projections.

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TABLE B-5

Adams County and Marion County
Population Trends and Projections
1940-2000

Year	Illinois Bureau of the Budget	Percent Change	Rock Island Corps of Engineers	Percent Change	OBERS	Percent Change
1940	110,052[a]	---				
1950	103,590[a]	-5.87				
1960	103,975[a]	.37				
1970	103,767[a]	.20				
1980	102,020	-1.68	104,294[a]	.51	100,700	1.5
1990	101,983	- .04	104,815	.50	108,300	7.5
2000	111,743	9.57	105,340	.50	111,500	3.0

[a] US Bureau of the Census Data.

Available data for the past two decades indicate that industrial investment in the flood plain continued at about a 5 percent annual rate. When comparing this against the population change, it was decided that there is not a relationship between demographic trends and investment in the flood plain. Changes in the manufacturing processes through increased capital investment and reduction in manpower requirements per unit of product are two of the reasons investment may increase without increasing the labor force. This is what is happening in the study area.

Increased investment in the flood plain will occur from either the expansion of existing firms or the establishment of new firms in the area. Increased investment must be held constant for inflation and only real increases of investment may be used. Existing industries may increase their investment through capital expenditures on technologically advanced machinery without an expansion of facilities. When this occurs, there are few physical limitations on the amount of investment. A firm may expand operations, construct new facilities, and increase plant capacity. In this case, there must be land available for expansion and there must be adequate support facilities such as transportation access, adequate water supply, and sewage, and a lack of conflict with competing land use such as residential areas.

Increased investment in the flood plain was calculated based on historical trends. Interviews with plant managers and related statistical data support this approach. Because data on individual privately owned firms

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was unavailable, a common source of data, the Illinois Manufacturer Directory, was used to establish employment and investment trends over the preceeding 20 years in 5-year intervals. This analysis indicates that the flood plain industries, as a group, showed an annual compound interest rate of growth of 5 percent. Table B-6 shows the projected property values for two different rates of growth.

TABLE B-6

Projected Investment in the Flood Plain by Existing Industries
1981-2000

Current Total Investment (1980)	Compound Annual Growth Rate Assumptions	Projected Total Investment (2000)	Additional Investment Over 20-Year Period	Average Annual Growth in Investment
$313M	5.0%	$830.48M	$517.48M	$25.87M/yr.
$313M	2.6% yrs. 1-10 2.7% yrs. 10-20	$528.54M	$215.54M	$10.77M/yr.

This 5 percent rate of growth should be examined when viewed from the perspective of the existing physical conditions. Although the District was not flooded in 1973, the potential for flooding remains. This has not noticeably retarded the growth of the area. The District has many locational features attractive to industry, including hundreds of acres of flat, open land, railroad access, highway access, available utilities, and an absence of nearby conflicting land uses.

Although the 5 percent annual rate of growth appears to accurately reflect both the historical rate and the future rate of growth, the uncertainty of economic conditions and growth trends in general lean toward the adoption of a more conservative rate. The Office of the Bureau of Economic Research Service Series "E" projections have been developed for Adams County, Illinois. Using these projections for growth in the major industries currently in the flood plain, an average annual rate of growth of 2.6 percent the first dedade, and 2.7 percent for the second decade was used. This lower rate of growth reflects the entire county area and not solely the flood plain study area. This rate was adopted because it was a more conservative estimate.

In addition to growth in the industrial and commercial sector, a 1 percent annual growth in the value of crops for a 20-year period was also used. This assumes increases in yields through technological changes such as improved yields from new hybrids, and real cost increases. This increase is based on projections by the US Department of Agriculture Economic Research Service.

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Future growth in the residential and public sectors was not assessed. The physiography of the study area precludes significant residential development. With the expected growth in the industrial area, public facilities would be expanded, to a minor extent. The only significant increase in public investment that could occur would be at the Quincy Sewage Treatment Plant, but this is not anticipated. For these reasons, future growth in these two areas is not anticipated.

In summary, future growth benefits account for one-third of the total benefits of the proposed project. However, the inclusion of future growth does not affect the project's viability because existing damages alone will justify the project. The projected flood damages reflect a rate of growth much lower than the study area has experienced historically. However, because project viability is not affected, the more conservative value was used.

OTHER BENEFIT CATEGORIES

There are several other types of benefits that will occur if the proposed project is implemented. Flood insurance will no longer be required, saving the cost of program administration. There would be no need for flood-fighting efforts such as occurred in 1973. There may be additional benefits for land-use intensification, and location benefits. However, these additional categories were not evaluated because their impact on the project viability would be insignificant.

SECTION 4 - COSTS

Cost estimates were developed for all alternatives studied based upon October 1981 price levels. Table B-7 presents a detailed cost estimate for the tentatively selected plan.

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TABLE B-7

Summary of First Costs
October 1981 Prices

Description	Quantity	Unit	Unit Price ($)	Federal Costs ($)	Non-Federal Costs ($)
Lands and Damages					260,000
TOTAL LANDS AND DAMAGES					260,000
Relocations					
Power Line Sta. -4+10 to -5+10	100	lin ft	70.00		7,000
Power Line Sta. 16+60	1	Job	Sum		4,000
Power Line Crossing 162+00	100	lin ft	70.00		7,000
Power Line Crossing 178+00	1	Job	Sum		2,000
Power Line Sta. 462+00	1	Job	Sum		1,500
Road Raise and Ramps					
Sta. 450+00 to 461+80 Granular Surfacing	409	yd^3	11.00		4,500
Modify Existing 3-8" Oil Lines Crossing Line of Protection Sta. 18+00				5,000	
Modify Existing 18" Cooling Water Effluent Crossing Line of Protection Sta. 18+00				5,500	
SUBTOTAL				10,500	26,000
25% CONTINGENCIES				2,600	6,000
TOTAL				13,100	32,000
Levees and Floodwalls					
Impervious fill					
Sta. -10+34 to -18+00	5,400	yd^3	5.25	28,350	
Sta. 7+85 to 22+50	2,600	yd^3	7.50	19,500	
Sta. 401+00 to 469+20	140,900	yd^3	2.50	352,250	
Stripping 6"					
Sta. -10+34 to -18+00	700	yd^3	8.25	5,775	
Sta. 401+00 to 469+20	10,200	yd^3	5.50	56,100	
Inspection Trench					
Sta. 461+80 to 469+20	2,500	yd^3	3.00	7,500	

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TABLE B-7 (Cont'd)

Description	Quantity	Unit	Unit Price ($)	Federal Costs ($)	Non-Federal Costs ($)
Pervious Fill					
Sta. 7+85 to 22+50	30,500	yd^3	3.00	91,500	
Sta. 73+50 to 401+00	994,800	yd^3	3.00	2,984,400	
Berms	111,100	yd^3	3.00	333,300	
Stripping 6"					
Sta. 7+85 to 22+50	2,500	yd^3	5.50	13,750	
Sta. 73+50 to 401+00	80,900	yd^3	5.50	444,950	
Berms	10,600	yd^3	5.50	58,300	
Seeding-Landfill	15	acre	500.00	7,500	
Seeding-Sandfill	190	acre	1,300.00	247,000	
Riprap Sta. 7+85 to 22+50	1,000	yd^3	30.00	30,000	
Sta. -10+34 to -13+00	743	yd^3	30.00	22,290	
Bedding Sta. -10+34 to -13+00	248	yd^3	25.00	6,200	
Adapt Existing Transfer Sewer to Flood Control Wall	2,100	lin ft	160.00	336,000	
Railroad Closure					
Sta. 7+72, Remove Old Closure	1	Job	Sum	10,000	
Temporary Bridge	1	Job	Sum	38,000	
Closure Strucure	1	Job	Sum	192,000	
Raise Existing Wall					
Sta. 1+06 to 6+12,					
Impervious Fill	1,100	yd^3	6.00	6,600	
Riprap	625	yd^3	25.00	15,625	
Bedding	200	yd^3	25.00	5,000	
Concrete	290	yd^3	250.00	72,500	
Drill and Grout Reinforcing into Existing Concrete	950	Ea	10.00	9,500	
Excavation	400	yd^3	5.50	2,200	
Shear Lugs	750	Ea	5.00	3,750	
Concrete Wall and Closures					
Sta. 1+06 to Sta. -3+50					
Pedestrian Bridge Closure	1	Job	Sum	25,000	
Relocate Metal Framing on Building	1	Job	Sum	1,000	
Relocate Sheet Metal Duct	1	Job	Sum	2,000	

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TABLE B-7 (Cont'd)

Description	Quantity	Unit	Unit Price ($)	Federal Costs ($)	Non-Federal Costs ($)
Relocate 6" Pipe 300 lin ft	1	Job	Sum	2,000	
Relocate 3" Pipe 100 lin ft	1	Job	Sum	500	
Install 6" of Cl. Sewer	1	Job	Sum	11,500	
Pedestrial Bridge Closure	1	Job	Sum	25,000	
I-Wall Near Highway	20	lin ft	600.00	12,000	
Dewatering for New Wall	1	Job	Sum	20,000	
Excavation	425	yd^3	6.00	2,550	
Backfill	200	yd^3	7.00	1,400	
Concrete	505	yd^3	250.00	126,250	
PZ27 Steel Sheetpiling	7,500	ft^2	19.00	142,500	
Concrete Wall, Sta. -4+15 to -10+45					
Concrete	530	yd^3	250.00	132,500	
Excavation	750	yd^3	6.00	4,500	
Fill, Impervious	2,300	yd^3	7.00	16,100	
PZ27 Steel Sheetpiling	6,000	ft^2	19.00	114,000	
Toe Drain	400	lin ft	21.00	8,400	
CMP, 12" Ø Trench	120	lin ft	30.00	3,600	
Replace Bridge Guard Rail with Solid Barrier	1	Job	Sum	15,000	
Ramp Sta. 18+40					
Remove Roadway Stone and Surfacing	160	yd^3	5.00	800	
Embankment	5,600	yd^3	3.00	16,800	
Granular Surfacing	170	yd^3	11.00	1,870	
Bituminous Surfacing	830	yd^3	5.00	4,150	
Ramp Sta. 102+00					
Embankment	200	yd^3	3.00	600	
Granular Surfacing	80	yd^3	11.00	880	
Ramps 222+50 & 229+60					
Embankment	280	yd^3	3.00	840	
Granular Surfacing	60	yd^3	11.00	660	
Ramp Sta. 408+00					
Embankment	700	yd^3	5.25	3,675	
Granular Surfacing	70	yd^3	11.00	770	
Ramp 450+00 & 461+80					
Embankment	2,500	yd^3	5.25	13,125	

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TABLE B-7 (Cont'd)

Description	Quantity	Unit	Unit Price ($)	Federal Costs ($)	Non-Federal Costs ($)
Ramp 467+85					
Construct Temporary By-Pass	1	Job	Sum	30,000	
Remove Conc. 24' Roadway	360	yd^3	50.00	18,000	
Remove Roadway Stone	360	yd^3	3.50	1,260	
Embankment	1,200	yd^3	5.25	6,300	
Granular Surfacing	360	yd^3	11.00	3,960	
Concrete Surfacing	360	yd^3	125.00	45,000	
Clearing Levee	11	acre	2,000.00	22,000	
Borrow	18	acre	3,000.00	54,000	
	SUBTOTAL			6,290,330	
	25% CONTINGENCIES			1,566,370	
	TOTAL			7,856,700	
Drainage Facilities					
Sta. -1+06 to -3+50					
Gatewell, 12" Ø Sewer	1	Job	Sum	25,000	
Slidegate, Wall Mounted	1	Job	Sum	5,000	
Sta. -4+15 to -10+45					
Slide Gates, 12" Ø Wall Mounted	7	Ea	5,000.00	35,000	
Slide Gate, 30" Ø Wall Mounted	1	Ea	10,000.00	10,000	
Catch Basin	4	Ea	3,000.00	12,000	
	SUBTOTAL			87,000	
	25% CONTINGENCIES			22,000	
	TOTAL			109,000	
Pump Plant Alterations					
Cofferdam & Dewatering	1	Job	35,000.00	35,000	
Riprap, Removal & Replace with New	540	yd^3	33.00	17,820	
Remove & Replace 36" Ø Steel Discharge Pipe	292	lin ft	15.00	4,380	
Installation of New 36" Ø Steel Discharge Pipe	64	lin ft	50.00	3,200	
Couplings 36"	4	Ea	150.00	600	
Remove & Replace Steel Hanger	1	Ea	200.00	200	
Replace with New 10WF 21 Piling	3	Ea	75.00	225	

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TABLE B-7 (Cont'd)

Description	Quantity	Unit	Unit Price ($)	Federal Costs ($)	Non-Federal Costs ($)
Embankment	400	yd^3	5.25	2,100	
Excavation	1,400	yd^3	3.00	4,200	
Air Relief Check Valve	2	Ea	300.00	600	
Vacuum Break Gate Valves	2	Ea	500.00	1,000	
	SUBTOTAL			69,325	
	25% CONTINGENCIES			17,075	
	TOTAL			86,400	

SUMMARY OF FIRST COSTS ($)

Item	Federal	Non-Federal
Lands and Damages		260,000
Relocations	13,100	32,000
Levees and Floodwalls	7,856,700	
Drainage Facilities	109,000	
Pumping Plants	86,400	
Total Contract Cost	8,065,200	292,000
Engineering and Design	927,500	
Supervisory and Administrative	604,300	
Total Final Cost	9,597,000	292,000

Average annual costs are presented in Table B-8 for each of the alternatives studied. In addition to estimated first costs, interest during construction was computed based on a 2-year construction period for those plans costing less than $10 million, and on a 3-year basis for those plans estimated at more than $10 million, with expenditures occurring evenly throughout construction.

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TABLE B-8A

Estimated Annual Costs ($1,000's)
South Quincy Drainage District
(Landfill & Hydraulic Fill)

Proposed Plan	100-yr		200-yr		500-yr		SPF	
	Fed.	Non-Fed.	Fed.	Non-Fed.	Fed.	Non-Fed.	Fed.	Non-Fed.
First Costs ($1,000's)	2,308.0	106.0	6,468.0	176.0	9,597.0	292.0	21,705.0	889.0
Construc. Period (yrs.)	2		2		2		3	
Int. During Construction ($1,000's)	181.1	8.7	507.5	13.8	753.0	22.9	2,623.7	107.5
Total Cost ($1,000's)	2,489.1	114.3	6,975.5	189.8	10,350.0	314.9	24,328.7	996.5
Avg. Ann. Cost 7-5/8% 100-yr. life ($1,000's)	189.9	8.7	532.2	14.5	789.7	24.0	1,856.3	76.0
Annual O&M ($1,000's)		4.6		4.6		4.6		4.6
Total Annual Costs ($1,000's)	189.9	13.3	532.2	19.1	789.7	28.6	1,856.3	80.6

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TABLE D-8B

Estimated Annual Costs ($1,000's)
South Quincy Drainage District
(Landfill)

Proposed Plan	100-yr		200-yr		500-yr		SPF	
	Fed.	Non-Fed.	Fed.	Non-Fed.	Fed.	Non-Fed.	Fed.	Non-Fed.
First Costs ($1,000's)	2,994.9	215.8	6,085.2	311.1	9,902.9	448.8	27,489.5	1,268.7
Construc. Period (yrs.)	2		2		2		3	
Int. During Construction ($1,000's)	235.0	16.9	477.4	24.4	1,197.0	54.3	3,265.1	150.7
Total Cost ($1,000's)	3,229.9	232.7	6,562.6	335.5	11,099.9	503.1	30,754.6	1,419.4
Avg. Ann. Cost 7-5/8% 100-yr. life ($1,000's)	246.4	17.8	500.7	25.6	846.9	38.4	2,346.5	108.3
Annual O&M ($1,000's)		4.6		4.6		4.6		4.6
Total Annual Costs ($1,000's)	246.4	22.4	500.7	30.2	846.9	43.0	2,346.5	112.9

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TABLE B-8C

Estimated Annual Costs ($1,000's)
South Quincy Industrial Levee

Proposed Plan	100-yr		200-yr		500-yr		SPF	
	Fed.	Non-Fed.	Fed.	Non-Fed.	Fed.	Non-Fed.	Fed.	Non-Fed.
First Costs ($1,000's)	6,288.0	1,553.0	7,698.0	1,675.0	9,107.0	1,798.0	16,046.0	1,805.0
Construc. Period (yrs.)	2		2		3		3	
Int. During Construction ($1,000's)	493.3	121.8	604.0	131.4	1,100.9	217.3	1,939.6	218.2
Total Cost ($1,000's)	6,781.3	1,674.8	8,302.0	1,806.4	10,207.9	2,015.3	17,985.6	2,023.2
Avg. Ann. Cost 7-5/8% 100-yr. life ($1,000's)	517.4	127.8	633.4	137.8	778.8	153.8	1,372.3	154.4
Annual O&M ($1,000's)		4.0		4.0		4.0		4.0
Total Annual Costs ($1,000's)	517.4	131.8	633.4	141.8	778.8	157.8	1,372.3	158.4

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SECTION 5 - SENSITIVITY ANALYSIS

Additional analyses were conducted to determine project viability as related to two different decision criteria. The first of these is the discount interest rate used in the analysis. An increase in the discount rate reduces the present value of anticipated future growth; it increases the total amount of interest during construction; and it increases the annual costs of the project. Table B-9 shows the results of varying the interest rate on the plan for using hydraulic fill and raising the existing levee to provide a 500-year level of flood protection.

TABLE B-9

Project Viability for Varying Interest Rates

Interest Rates	Total Annual Benefits ($1,000's)	Average Annual Costs ($1,000's)	BCR
7.625	4,317.7	818.3	5.3
7.875	4,305.3	847.0	5.1
8.0	4,299.2	861.1	5.0
10.0	4,210.0	1,096.2	3.8
16.0	4,014.6	1,855.6	2.2
20.0	3,925.7	2,408.4	1.6
30.0	3,783.9	3,966.5	0.95

The internal rate of return for this project, which is the interest rate of evaluation at which the net benefits are zero, is 29 percent.

The second decision criterion that has an impact on project evaluation evolves from recent guidance provided by the Office of the Chief of Engineers. It concerns the evaluation of flood damage reduction benefits in the freeboard zone of a levee project. In view of the complexity of assessing the ability of a project to pass floods greater than the design flood, a simple method which is acceptable in the absence of better data is to claim one-half the area under the frequency-damage curve between the design level of protection and the largest flood which might be carried within the freeboard. Traditionally, freeboard protection has not been considered, and this is the way the analysis in this report was carried out. Should the freeboard protection be considered for the proposed 500-year project, an additional $230,000 in annual benefits could be claimed. However, should the freeboard zone of the existing project be evaluated in a similar manner, approximately $1,850,000 of the equivalent annual benefits could not be attributed to the proposed levee raise. This would reduce the benefit-to-cost ratio for the tentatively selected plan from 5.3 to 3.0. Because the project's viability is insensitive to this decision criterion, a more detailed analysis was not carried out.

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SECTION 6 - SUMMARY OF BENEFITS

Table B-10 presents a summary of the benefits and costs of the four levels of protection for the different plans studied. From this table, several conclusions can be made.

All of the plans examined have benefit-to-cost ratios greater than 1.0 because of the very high value of property behind the levee having the potential to sustain serious flood damage. The South Quincy ring levee appears to be an economically viable plan. However, this plan does not provide protection to the majority of the levee district and may serve to limit future growth because it restricts the land available, and is generally socially unacceptable.

The plan with the maximum net benefits, that is also an acceptable plan to the local sponsor, is raising the existing levee to provide a 500-year level of flood protection using hydraulic fill. This plan has a benefit-to-cost ratio of 5.3 and has annual net benefits of $3,504,700.

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TABLE B-(1)

Summary of Benefits and Costs ($1,000's)

	South Quincy Drainage District				South Quincy Industrial			
	100-yr	200-yr	500-yr	SPF	100-yr	200-yr	500-yr	SPF
Existing Annual Benefits	1,488.0	2,320.5	2,894.5	3,326.3	1,470.9	2,291.2	2,851.2	3,262.3
Industrial/Commercial	(1,474.0)	(2,299.5)	(2,867.7)	(3,284.9)	(1,470.5)	(2,290.6)	(2,850.4)	(3,261.4)
Residential	(5.8)	(8.6)	(10.4)	(11.7)	(.4)	(.6)	(.8)	(.9)
Agricultural	(7.6)	(11.0)	(13.2)	(14.9)	(0)	(0)	(0)	(0)
Public	(.6)	(1.4)	(3.2)	(14.8)	(0)	(0)	(0)	(0)
Future Growth Benefits	734.6	1,146.1	1,428.5	1,636.5	731.0	1,138.6	1,416.8	1,621.1
Total Equivalent Annual Benefits	2,222.6	3,467.0	4,323.0	4,962.8	2,201.9	3,429.8	4,268.0	4,883.4
Best Alternative BCR for Existing Condition Only	7.3	4.4	3.5	1.7	2.3	2.9	3.0	2.1
Annual Costs Using Hydraulic & Land Fill	203.2	551.3	818.3	1,936.9				
BCR Using Hydraulic & Land Fill	10.9	6.3	5.3	2.6				
Annual Cost Using Land Fill	268.8	530.9	889.9	2,459.4	649.2	775.2	936.6	1,530.7
BCR Using Land Fill	8.3	6.5	4.8	2.0	3.4	4.4	4.6	3.2
MAXIMUM NET BENEFITS	2,019.4	2,936.1	3,504.7	3,025.9	1,552.7	2,654.6	3,331.4	3,352.7

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TABLE B-11

Summary Table of Annualized Residual Flood Damages By Decade ($1,000's)

PLAN	Existing Conditions	Base Year P_0	Time Period 2/ P_{10}	P_{20}	P_{100}	Residual Average Annual Equivalent Damages 1/
Raising the existing levee to provide protection for						
100-yr level	1,838.7	2,204.2	2,792.3	3,079.8	3,079.8	2,733.0
200-yr level	1,005.8	1,204.1	1,523.3	1,679.3	1,679.3	1,491.2
500-yr level	432.3	516.4	651.9	717.7	717.7	637.9
SPF level	0	0	0	0	0	0
Construct the industrial ring levee to provide protection for						
100-yr level	1,856.3	2,222.5	2,811.7	3,099.3	3,099.3	2,752.2
200-yr level	1,036.0	1,235.7	1,556.8	1,713.2	1,713.2	1,524.3
500-yr level	476.0	562.2	700.2	767.1	767.1	686.1
SPF level	65.0	67.7	71.4	72.5	72.5	70.8

1/ Should the project not be built, Average Annual Equivalent Damages would be reduced by 3.5 percent to $4,797,300 to account for those industries that would not invest in the study area without additional flood protection. This reflects a 10 percent decrease in future annual investment in the study area.

2/ The designations P_{10} and P_{20} identify the 10th and 20th years, respectively, for the project life.

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DAMAGE SURVEY FORM

(Summary of Data)

OMB APPROVAL NO. 49-R0363

COMMERCIAL SURVEY ____ INDUSTRIAL SURVEY ____ REACH _____ DATE 1980

NAME OF FIRM OR BUSINESS All TITLE _____

ADDRESS South Quincy Drainage District

TYPE OF BUSINESS Manufacturing/ Warehousing

GROUND ELEVATION varies FLOOR ELEVATION varies DAMAGE ELEVATION _____

IF ADDITIONAL SPACE IS NEEDED FOR A PARTICULAR ITEM, CONTINUE ON REVERSE SIDE INDICATING ITEM NUMBER.

Background Information

1. How long have you been at this address? 20 Years Months
2. Principal structure: Type varies Type varies
   Secondary structure(s): Type varies Type _____
   (block/brick, steel, wood)
3. While at this location, approximately how many times did this facility experience flood damage? 4 List dates if possible 1947, '60, '65, '73 before 1967 - approx. flow level
4. In relation to the first floor, what was the deepest flooding experienced? after 1967 - damage varies Date _____
5. Under what conditions did (or does) flooding occur? overtop of levee and some (i.e., rain, heavy rain, spring thaw, etc.) damage due to seepage
6. What is the cause of the flooding? Mississippi River (i.e., river, stream, storm sewer overflow, etc.)
7. How does the water enter the structure? All (i.e., doors, basement windows, sewer backup, seepage, etc.)
8. Do you have flood insurance? Yes x No ____ Deductible $ _____
9. How long does it take for floodwaters to recede from this facility? varies
10. During the past floods, have you experienced a disruption of utilities (water, gas, electricity, etc.)? no If so, how long? _____

Physical Damage

11. a. What is your estimate of the market value of this facility? $ 313 million
    b. What is the market value of the land on which it stands? $ 10,000/ acre
    c. What is the depreciated value of its contents (equipment)? $ included in (a.)
    d. What is the wholesale value of the inventory? $ 100 million +
12. Does the structure have a basement? some If so, what are the present uses of basement areas? underground warehouse is totally located below ground level
13. What type of sanitary sewage system do you have? sewer (i.e., sewer connection, septic tank, private lagoon, etc.)
14. Based on past experience, or your best estimate, please furnish damage estimates for past floods:

Depth of flooding (below) (above) first floor (ft)	Damage to structure ($)	Damage to equipment ($)	Damage to inventory ($)
1	153 million	included	included
5	196 million	in structure	in structure
10	219 million	damage	damage

☐ Check if information is confidential and state a time limit (ER 360-2-103, Sep 71) If checked, this information will be considered to be privileged or confidential as set forth in AR 340-17 and the Freedom of Information Act, 5 U.S.C. Section 552(b)(4).

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Business Losses

15. Has there been any loss of sales/production for your establishment during periods of flooding (most recent floods)? yes If so, how much loss and the dollar amount? $ Has the loss of production/sales been made up by other firms or offices? no If so, where is the firm located?
16. What are your annual average sales? $80 million average of 5 [illegible] locations 500 million total
17. What is your average annual operating costs (exclude labor)? $
18. Do you know other businesses which would be adversely affected if your business were to close down during flooding?
19. What amount of your lost business would be recovered following continuation of normal operations after flooding? * percent* varies by type of industry and by the state of the economy.

Wage Loss

20. For the most serious flood event, please estimate the number of employees 715 total and days 20 avg. spent away from the job because of flooding problems.
21. What is average daily employment? 1083 total
22. What is the average payroll, including fringe benefits? 15.4 million total

Flood Fighting and Cleanup Costs

23. What, if anything, have you or others done to floodproof? development of emergency flood plans
24. What emergency measures did you take to prevent damage? evacuation and sandbagging How much did these measures cost? How much damage was prevented? $
25. How many hours of warning would you need to take practical emergency measures to protect your business and minimize physical losses? 2 days
26. For the most serious flood event estimate the number of employees 650 total and days spent cleaning up. Additional Cost? $ 300,000 over and above labor costs

Location and Intensification

27. Were you aware of a flood problem before moving here? yes If so, would you have moved here if you had known? What are the advantages of this site that offset the risk of loss due to flooding? locational advantages including availability of water transportation
28. As a result of past flooding, have you considered selling and/or moving to a flood-free area? no
29. Has the threat of flooding influenced decisions regarding:
    - purchases of new production equipment? no
    - construction of new buildings? no
    - expansion of production or sales capacity? no
30. Do you have any plans to build new facilities at different locations in the subject area? no (Explain.)

Obtained by BID personnel Title

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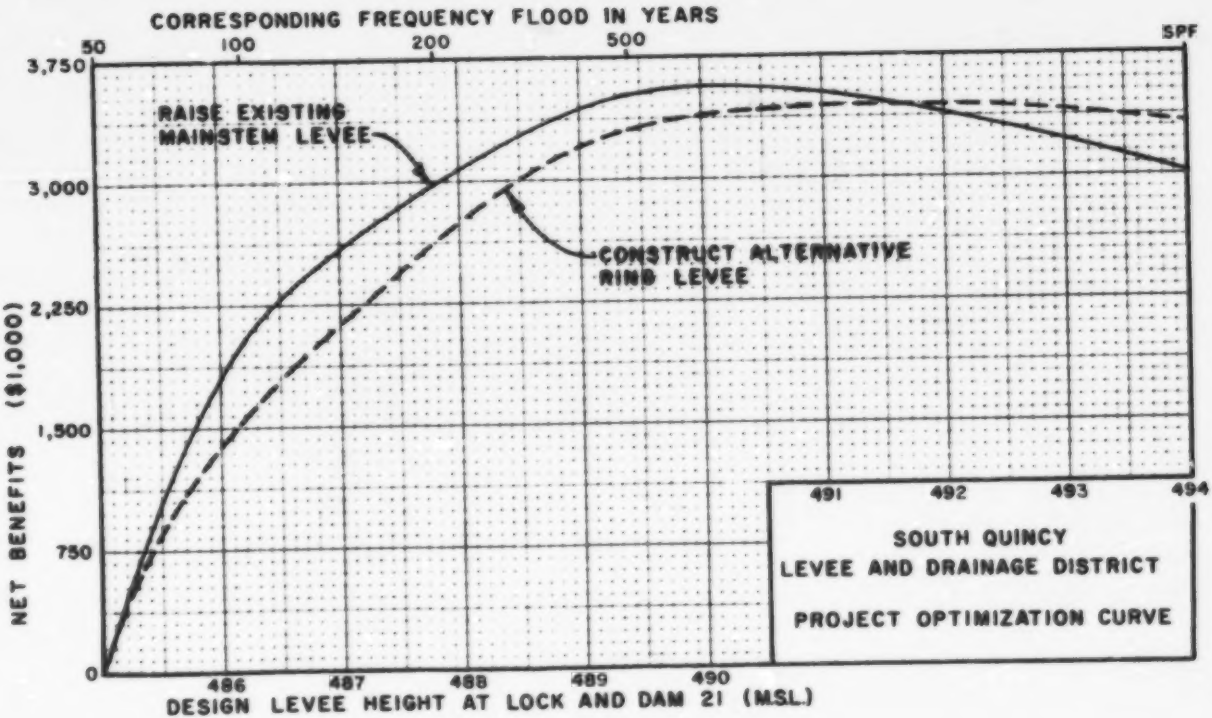

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APPENDIX C

PERTINENT CORRESPONDENCE

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MISSISSIPPI RIVER
COON RAPIDS DAM TO OHIO RIVER
FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION
SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
ILLINOIS
INTERIM REPORT NO. 3

APPENDIX C - PERTINENT CORRESPONDENCE

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Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway/Springfield, Illinois/62764

September 22, 1975

Rock Island District

Colonel Daniel L. Lycan
District Engineer
Rock Island District
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Lycan:

This letter replies to the notice of September 11, 1975 of your intent to study the Fabius River Drainage District, South River Drainage District, and South Quincy Drainage and Levee District levees under the Mississippi River: Coon Rapids Dam to Ohio River authority.

Our main concern is that any proposals for realining or upgrading levees be accompanied by careful study of possible increases in flood stages, velocity, and damages. Any recommendations that result in significant increase in flood damages should be accompanied by measures to compensate the increased damages.

We have made the same recommendations for other levee projects. The principle is embodied in Rule 6.5 of our floodplain regulations, which have been furnished to you as an appendix in "State of Illinois Guidelines for Floodplain Studies."

Please keep me informed of the status and results of your investigations.

Sincerely,

Leo M. Eisel
Director
Division of Water Resources

LME:BB:er

cc: Ann Duker
A. L. Kellerstrass
P. Kay Whitlock

Appendix 2

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United States Department of the Interior
NATIONAL PARK SERVICE
INTERAGENCY ARCHEOLOGICAL SERVICES - DENVER
OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION
1978 SOUTH GARRISON - ROOM 107
DENVER, COLORADO 80227

IN REPLY REFER TO
A96-PI(D)

OCT 0 1 1975

Major George J. Dougherty
Deputy District Engineer
Rock Island District Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Dear Major Dougherty:

This is in reply to your letter of September 16 (NCRED-PB) regarding proposed studies relating to modifications to the Fabius River Drainage District and South River Drainage District, Missouri, and South Quincy Drainage and Levee District, Illinois, flood control projects. Other than to advise you of the requirements of Executive Order 11593 of May 13, 1971, we cannot provide assistance with historic preservation matters until studies have been completed to identify and evaluate archeological and historic resources that may be affected by these projects. We urge that your office consult with the Missouri and Illinois State Historic Preservation Officers and the Missouri Archaeological Survey and Illinois Archaeological Survey regarding archeological and historic sites that may be within the proposed project areas. It may be necessary to conduct a survey of all of the project areas in order to identify and evaluate cultural remains that might be affected by the projects.

We strongly urge that the necessary investigations be initiated sufficiently early in the planning process to permit consideration be given to all possible means of avoiding or minimizing any adverse impacts accruing to cultural resources as a result of these projects. These investigations must be performed by qualified professional personnel in order to provide a sound basis for management decisions affecting these resources.

Archeological and historic resources discovered as a result of such investigations should be evaluated in terms of the criteria for nomination to the National Register of Historic Places. If any sites are determined to be eligible for the National Register, either through actual nomination or by solicitation for a formal determination of eligibility from the Secretary of the Interior through the Keeper of the National Register, procedures for compliance with Section 106

of the National Historic Preservation Act of 1966 should be completed prior to implementation of mitigative measures in accordance with the procedures of the Advisory Council on Historic Preservation (36 CFR 800).

Thank you for providing us advance notification of these proposed projects. However, the Interagency Archeological Services Division of the National Park Service administers only those responsibilities accruing to the Secretary of the Interior by virtue of the Antiquities Act of 1906, Executive Order 11593 of May 13, 1971, and the Archeological and Historic Preservation Act of 1974 (Public Law 93-291). Review and comment on proposed projects and reviews of draft and final environmental impact statements has remained a Regional Office responsibility. Please address future requests for such reviews directly to the Regional Director, Midwest Regional Office, National Park Service, 1709 Jackson Street, Omaha, Nebraska 68102.

We will be happy to continue to advise your office on historic preservation matters in our consultant role under Executive Order 11593 and assist you pursuant to the Secretary of Interior's authorities and responsibilities under Public Law 93-291.

Sincerely yours,

Jack R Rudy
Chief, Interagency
Archeological Services - Denver

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LAW OFFICES

HUNTER & HUTMACHER

[illegible]

QUINCY, ILLINOIS 62301

[illegible]

[illegible]

October 23, 1975

Rock Island District
Corps of Engineers
Attention: Mr. Marvin Williams
Clock Tower Building
Rock Island, Illinois 61201

Dear Mr. Williams:

This letter will confirm our conversation of October 22, 1975, with respect to the feasibility study that is being made by the Corps with respect to the South Quincy Drainage and Levee District.

I understand that the Congress has authorized a study of all Levee Districts with respect to the feasibility of an increase in the height of the levees. The Commissioners have discussed the advantages of the feasibility study and give their wholehearted support to this study. This letter should serve as a letter of interest and acknowledgement to the District of such a study and, hopefully, of an increase in the height of our levee. As prior correspondence indicates, from our district there is intense industrial development which is reliant upon the Drainage District levee for protection. Thank you.

Very truly yours,

Matthew A. Hutmacher

Matthew A. Hutmacher

MAH:lk

Appendix 2

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STATE OF ILLINOIS

DEPARTMENT OF CONSERVATION

October 31, 1975

Major George J. Dougherty
Deputy District Engineer
Department of the Army
Rock Island District
Corps of Engineers
Clock Tower Building
Rock Island, IL 61201

Re: SCSLD-FS

Dear Major Dougherty:

Thank you for your letter of September 30, 1975 in which you advised us of your studies concerning the South Fulsaw Drainage and Levee District, Illinois.

We have completed our review of the data you submitted to us and we offer the following comments for your consideration.

1. The proposed project does not appear to have any impact on lands owned or operated by the Illinois Department of Conservation.

2. We assume if the project proves feasible that the cultural-historical aspects of potential project impacts will be fully explored.

3. We have no current knowledge of any significant natural areas within this drainage district.

4. Portions of the Mississippi River adjacent to the levee district do provide some hunting opportunities. Therefore, it is possible any large scale construction project could have an effect on wildlife populations. We would want to be involved in project planning if this should become a viable project.

Appendix 2

5. If the project involves interior drainage, channelization, movement of levees, borrow areas, etc., we would also want to be involved in project planning since these activities could adversely affect fish, wildlife and forestry resources of the area.

We hope this information is useful to you and we ask that you keep us informed on the project's progress.

Sincerely,

Anthony T. Dean

ATD:ajb

Appendix 2

STATE OF ILLINOIS

DEPARTMENT OF CONSERVATION

ANTHONY T. DEAN
DIRECTOR

HAROLD L. FELLENDORF
ASSISTANT DIRECTOR

January 20, 1976

Mr. Boyle W. McCully
Chief, Engineering Division
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Dear Mr. McCully:

Thank you for your January 7, 1976 letter informing us of the feasibility study on South Quincy Levee and Drainage District, Adams County, Illinois.

In our letter of October 31, 1975 (copy enclosed) we outlined our general areas of concern based on the preliminary information your office supplied us.

If you could supply us with more specific information and maps outlining your intended course of action along with specific questions relating to this action we would be in a better position to respond to your request for our input on anticipated environmental impacts that could occur should this action be implemented.

We are also enclosing a copy of our publication, "Adams County Surface Water Resources." This publication should provide you resource information on the streams in the project area.

The following persons are quite familiar with the project area and should be able to answer any specific questions you may have regarding your environmental inventory:

Rob Dunn - District Fishery Biologist
211 South Madison
Pittsfield, IL 62363
Phone: 217-285-2221
Mail: P. O. Box 621, Pittsfield, IL 62363

William Allen - Wildlife Manager
Siloam Springs State Park
R.R. 1
Clayton, IL 62324
Phone: 217-894-6295

Terry Hanke, District Forester
211 South Madison
P. O. Box 244
Pittsfield, IL 62363
Phone: 217-285-2221

We will look forward to reviewing the environmental inventory when completed.

Sincerely,

A. T. Dean

ATD:mjk
Attachments (2)
cc: Rob Dunn
William Allen
Terry Hanke

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Federal Building, Fort Snelling

Twin Cities, Minnesota 55111

IN REPLY REFER TO: ES

FEB 6 1976

Colonel Daniel L. Lycan
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Lycan:

This letter refers to proposed levee projects at South Quincy Levee and Drainage District, Illinois; and the Fabius River and South River Drainage Districts in Missouri. Our comments have been coordinated with the Illinois Department of Conservation and Missouri Department of Conservation.

On December 8 and 9, 1975, a biologist from our Rock Island Area Office and Mr. Jerry Larsen from your Environmental Resources Branch conducted field investigations at the three drainage districts. Since this is an early coordination effort and your agency is not yet certain what measures will be taken to alleviate flooding problems in the districts, our comments are general in nature and apply primarily to anticipated impacts of structural methods which may be proposed to solve flooding problems.

Current land-use within these three levee districts is primarily agricultural with some industrial and commercial development just beginning. Thus, when flooding does occur, damages are relatively minor when compared to more urbanized areas.

Good to excellent wildlife habitat exists immediately outside the levee district boundaries in all three proposed project areas. This contrasts sharply with the sparse habitat existing within the levee districts. Areas outside the levee districts, adjacent to cropland and the river, provide food, cover and nesting habitat for a great number and variety of wildlife species. Agricultural and industrial developments already have destroyed most habitat within the levee districts. We oppose any further project-related habitat destruction outside the districts without adequate measures being implemented to compensate for losses. If levees are raised, we recommend that the added fill be placed on the landward side of the levees to prevent damage to fish and wildlife habitat. We urge that extreme care be taken when choosing borrow sites for reconstruction of flank levees. If hydraulic fill for

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mainstem levee construction is obtained from anywhere but the main channel on the Mississippi River, we would need to conduct investigations relative to the kind of aquatic habitat that would be destroyed. Any habitat destroyed must be compensated for by development of new habitat within the levee districts.

Fabius River Drainage District, Missouri

Most of the land within the drainage district is intensively developed for agricultural purposes with some commercial developments occurring along State Highway 24. Fish and wildlife habitat within the levee district is scarce and is restricted primarily to drainage ditches and old sloughs. Levee side slopes offer only marginal habitat as they are repeatedly mowed.

Durgans' Creek lies just outside the northern boundary of the district. The creek has been channelized and at best offers only a marginal fishery. Borrow materials could be taken from the creek, but in doing so, the narrow greenbelt bordering the stream would be destroyed. If this area is proposed for borrow, compensatory wildlife habitat development would be required within the levee district.

South River Drainage District, Missouri

Although lands within the district are intensively farmed, valuable wildlife habitat lies just outside the levees. These wetlands provide spawning habitat for fish, and food and cover for many game and non-game animals. This area is especially valuable wood duck habitat and must not be disturbed.

Fish and wildlife habitat is sparse within the levee district, although some wetlands border the Chicago, Burlington and Quincy railroad tracks. Old backwater sloughs and streams provide additional habitat for fish, waterfowl, kingfishers, mink, muskrats, raccoons, and other species associated with wetlands. Levee sideslopes are mowed frequently and thus offer only marginal habitat. Valuable habitat parallels the levee base on the landward side in the vicinity of the expanding industrial area. Raising or expanding the levee base landward in this area would destroy important wildlife habitat. Consequently, new habitat development within the levee district would be necessary to compensate for project-related losses. Borrow materials for flank levees could be

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO
LSM

APR 6 1976

Colonel Daniel L. Lycan
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Lycan:

This letter concerns the South Quincy Levee and Drainage District, Illinois, the Fabius River Drainage District, Missouri and South River Drainage District, Missouri in respect to your letter of March 4, 1976.

We agree that it is important to involve conservation agencies early in the planning process. Early coordination expedites problem solving and helps ensure that fish and wildlife values are given equal consideration in the planning process.

On December 15 and 16, 1975, biologists from your Environmental Resources Branch and our Rock Island Area Office conducted field investigations in the three levee districts. These investigations were conducted in mid-winter, a time when meaningful sampling and habitat typing is nearly impossible. We discussed this problem during the March 4, 1976 coordination meeting and agreed that a two-phase fish and wildlife report would be necessary at times, depending upon when the initial field investigation is conducted. Therefore, with this view in mind and the data obtained from our cursory investigation of the districts, we offer the following information and recommendations that should be considered in the initial planning process.

When searching for solutions to the flooding problems in this instance, the "No Program" alternative should be given serious thought. Current land-use within the three districts is primarily agricultural with some industrial and commercial development just beginning. When flooding does occur, damages are relatively minor when compared to more urbanized areas.

Although flood protection systems usually do not provide absolute protection against all floods, levee systems oftentimes appear to lull residents into a false sense of security. Uncontrolled development behind levee systems, such as these in question, could be responsible for increased flood damages. Since the Flood Disaster Protection Act of 1973

provides strong impetus for communities to enact flood plain zoning, communities eventually must restrict flood plain development or suffer the loss of federal flood insurance and other benefits. Thus, the present 50-year levee systems act not only to prevent future flood plain development but actually provide a high degree of flood protection.

If raising the levees becomes the selected plan for the involved districts, we recommend that the required fill be placed on the landward side of the levees to help minimize the damage to fish and wildlife habitat. Extreme care must be taken when choosing borrow sites for reconstruction of flank levees. Also, if fill for mainstem levee construction is to be obtained from the Mississippi River, additional studies would be required to identify and evaluate the aquatic habitat which would be destroyed. Borrow to raise levee heights usually should be obtained from sites within the levee districts.

To further minimize anticipated losses of wildlife and/or fish habitats, we request that the following features be incorporated as part of the project:

1. Levee sideslopes should be mowed only after August 1 and preferrably every other year. Such a maintenance schedule not only would tend to increase wildlife habitat but may prevent growth of woody vegetation.

2. Compensation for fish and wildlife habitat destroyed during project construction should be obtained by developing new habitat within the levee district. Ten-foot buffer strips of natural vegetation maintained along each side of fence rows, roadside ditches, drainage ditches, sloughs and streams could serve this purpose.

3. Borrow materials should be excavated in a manner that would increase habitat diversity. The excavation and selection of borrow areas meanwhile should be coordinated with our office, the Missouri Department of Conservation and the Illinois Department of Conservation.

We greatly appreciate the efforts of your staff in this early coordination effort.

Sincerely yours,

cc: Illinois Dept. of Conservation
Missouri Dept. of Conservation

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taken from agricultural lands within the district or from previous borrow sites.

South Quincy Levee and Drainage District, Illinois

Good wildlife habitat lies immediately outside of the levee district. This habitat, most of which is adjacent to the river, provides food, cover and nesting areas for a variety of wildlife such as deer, herons, kingfishers, eagles and wood ducks. In contrast to the other levee districts, important fish and wildlife habitat also exists within the levee district. The numerous sloughs, backwater lakes and streams that dissect cropland are bordered by woodlots and herbaceous vegetation in various successional stages. This provides a highly diverse habitat for fish, waterfowl, mink, muskrat, raccoon, kingfishers, hawks, owls, and many other wildlife species.

Although farming is the primary land use, some industry has moved into the flood plain at the district's northern end and along State Highway 57. Increased flood protection would enhance land values and could eventually result in the loss of fish and wildlife and agricultural land to industrial and commercial development.

Discussion

We presume that your agency will consider all possible alternatives that will provide flood protection to residents of the area. Flood plain zoning and either government sponsored or private industry sponsored flood insurance are alternatives that we believe should be considered. The Flood Disaster Protection Act of 1973 provides strong impetus for communities to enact flood plain zoning regulations. If the existing 50-year levee systems are left intact and are complemented by sufficient flood damage insurance and adequate flood plain zoning regulations, an adequate amount of flood protection may be attained.

At such time that definite plans are developed by your agency, we will review each proposal individually and submit our comments and recommendations to you. We propose to supplement the Ecological Planning and Evaluation Procedures developed by the Joint Federal-State-Private Conservation Organization Committee in 1974 to study project impacts of future development. We would be pleased to have members of your staff participate in these studies.

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We greatly appreciate the efforts of your staff in this early coordination effort.

Sincerely yours,

Charles G. Sandefur

Acting Regional Director

cc: Illinois Dept. of Conservation,
Springfield
Missouri Dept. of Conservation,
Jefferson City

Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway / Springfield, Illinois/62764

January 5, 1977

Colonel Daniel L. Lycan
District Engineer
Rock Island District
U.S. Army Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Lycan:

At meeting December 20, 1976 held in Quincy, Illinois, your staff presented several alternatives to provide flood damage reduction for the City of Quincy and South Quincy Drainage and Levee District.

Please be advised we would be supportive of a program which provided economically favorable flood damage reduction for the industrial area of Quincy and South Quincy Drainage District.

We believe that a program can be developed to protect the industrial area of Quincy and South Quincy which will be both economically favorable and have a minimal impact upon flood heights of the Mississippi. We therefore prefer an alternative of combining Quincy and the industrial area of South Quincy.

Sincerely,

Albert L. Kellerstrass
Northern Projects Manager

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HUNTER HUTMACHER & RAFF

January 5, 1977

Rock Island Corps of Engineers
ATT: Henry Fiester
Clock Tower Building
Rock Island, Illinois 61201

Dear Mr. Fiester:

Several weeks ago there was a meeting in the City Council Chambers of Quincy, Illinois, concerning various alternatives available for flood control in the South Quincy Drainage and Levee District.

The Commissioners along with others attending the meeting were furnished with various alternatives to consider and were asked to comment upon the same.

The Commissioners strongly favor the following alternatives:

1. Complete the levee of City of Quincy and South Quincy Drainage and Levee District;

2. Improve levees-riverside fill-South Quincy;

3. Improve levees-landside fill-South Quincy;

The Commissioners strongly oppose the concept of ring levees for the commercial and industrial areas of South Quincy Drainage and Levee District due to severe reservations concerning the legality of such a "split-off" from the District.

We appreciate being invited to the meeting and having an opportunity to consider the alternatives. Should you have any further questions, please let us know.

Very truly yours,

Matthew A. Hutmacher

MAH/ma

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DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

SCRED-PB

28 JAN 1977

FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION
MISSISSIPPI RIVER - KEOKUK RAPIDS DAM TO OHIO RIVER
INTERIM REPORT NO. 1 - PART II
QUINCY, ILLINOIS
AND
SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT, ILLINOIS

SUMMARY OF ALTERNATIVES WORKSHOP

Inclosed for your information is a summary of the proceedings of the alternatives workshop concerning flood damage reduction studies for Quincy, Illinois, and South Quincy Drainage and Levee District, Illinois, held at Quincy, Illinois, on 20 December 1976.

The Corps of Engineers would like to thank all persons who participated in the workshop for their interest and constructive input. If anyone has additional information that would be helpful to us, or has an opinion to express concerning the study, please address your correspondence to the District Engineer, Rock Island District, Corps of Engineers, Clock Tower Building, Rock Island, Illinois 61201.

1 Incl
Public Meeting Summary

DANIEL L. LYCAN
Colonel, Corps of Engineers
District Engineer

28 JAN 1977

SUMMARY OF PROCEEDINGS OF THE ALTERNATIVES
WORKSHOP ON FEASIBILITY STUDIES FOR
FLOOD DAMAGE REDUCTION AT QUINCY, ILLINOIS
AND SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT, ILLINOIS

1. GENERAL

An alternatives workshop meeting was held by the Rock Island District, Corps of Engineers, on 20 December 1976 at the City Hall in Quincy, Illinois. The meeting was attended by about 35 persons representing Federal, state, and local agencies, interested individuals, and the news media.

2. MEETING

Mr. James Schnerre, Assistant Chief of the Rock Island District Planning and Reports Branch, introduced members of the Planning and Reports Branch staff and stated that the purpose of the meeting was to discuss the alternative flood damage reduction studies made, and to obtain the views and comments of the affected interests. The studies for South Quincy Drainage and Levee District, as Mr. Schnerre indicated, were authorized by a resolution adopted by the Committee on Public Works of the US House of Representatives in December 1969. The resolution directed the Corps of Engineers to review the existing projects along the Mississippi River to determine if improvements to provide a greater degree of flood protection would be warranted. Mr. Schnerre also explained that flood damage reduction studies for the City of Quincy were originally authorized and completed under the authority, Mississippi River - Cassville, Wisconsin, to Mile 300. The original studies for Quincy resulted in a report that federal participation in a project at Quincy would not be economically justified. Subsequent damage data furnished by the industries in the Quincy flood plain, however, indicates that Federal participation may now be justified, and the Office, Chief of Engineers has approved restudy of Quincy under the authority for the South Quincy Drainage and Levee District Study.

3. Mr. Schnerre continued with a brief outline of the Water Resource Council's guidelines called "Principles and Standards (P&S) for Planning Water and Related Land Resources" under which all Federal agencies must operate in conducting water resource studies. The guidelines direct that a systematic approach be used in analyzing publicly expressed problems, establishing planning objectives, and developing alternate resource management actions. The P&S also require that activities be directed toward

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achievement of two co-equal national objectives - National Economic Development and Environmental Quality. Achievement of the two objectives is the basis for establishing the "Federal Interest" in alternative plans of action.

4. Mr. Marvin Williams, Rock Island District Corps of Engineers, Study Manager for the Quincy and South Quincy studies, discussed the alternative studies thus far, and indicated that in all of the studies the two national objectives were considered along with the tests for determining the Federal Interest in the alternatives. He said that the condition that "no additional Federal action" be taken was determined first to serve as a base condition for assessing and evaluating the effects of the other alternatives. The base condition as evaluated consists of:

a. Flood warning, emergency flood control measures, temporary evacuation, and flood disaster relief programs now being used to reduce the hazard and impact of floods.

b. The estimated average annual damage of about $400,000 at Quincy, and about $1.1 million at South Quincy Drainage and Levee District, plus the cost of administering the flood insurance program and flood proofing new development represents the cost to the Nation of the "no additional Federal action" alternative.

c. With "no additional Federal action," no significant change in natural areas and associated ecological systems is anticipated. This would tend to support the national goal to preserve and enhance existing natural areas. Agricultural land use productivity in South Quincy Drainage and Levee District would probably continue at current levels. However, with flooding crops would be lost for the year. Commercial and industrial development in both Quincy and South Quincy Drainage and Levee District is anticipated to continue without additional flood protection. The National Flood Insurance Program would help reduce the impact of flood damages.

Mr. Williams next outlined the nonstructural and structural alternatives that have been studied to date. He stated that the nonstructural studies included floodproofing, flood plain evacuation, and flood plain regulation. Because of the extreme depth of water over the area should it be inundated, floodproofing would not be a practical solution to the problem. Flood plain evacuation was studied, but was also considered impractical. Mass evacuation would severely impact on the social stability and cohesion of the area residents.

Structural alternatives included:

a. Improve existing levees in South Quincy by placement of dredged sand fill on the top and landside slope of the levees.

b. Improve existing levees in South Quincy with clay fill from borrow areas on the bluff, placed on the top and riverside slope.

c. Construction of a new "ring" levee to protect only the commercial-industrial area of South Quincy.

d. Construction of a new levee-floodwall project to protect the industrial area of the City of Quincy.

e. Combined levee-floodwall project at Quincy and improvement of South Quincy levees.

Finally, Mr. Williams outlined the remaining steps in the report process should any alternatives warrant further study.

5. Mr. Schnerre then opened the meeting for statements and questions from the audience.

Statements presented at the meeting are summarized in the following paragraphs:

a. Gene Terry, Administrative Assistant to Congressman Paul Findley, stated that Congressman Findley maintains his full support of flood protection for Quincy.

b. John Taylor, Special Assistant to Senator Adlai E. Stevenson III, indicated that Senator Stevenson is hopeful that the flood problems at Quincy can be resolved.

c. Michael F. McClain, Illinois Representative, stressed the importance of a floodwall in Quincy and said he hopes a plan can be recommended that would not require relocation of the South Side Boat Club.

d. W. S. Black, President, Calcium Carbonate Company, urged that studies be pursued as quickly as possible to determine a plan of protection for the area.

e. Ron Sowiver, Executive Director, Industrial Association of Quincy, summarized the problems incurred in Quincy during the 1973 spring flood. He indicated that the loss of rail service, and the loss of access to Quincy by employees were the two major

problems. He also stated that many other commercial and industrial firms depend on the services provided by the industries in Quincy that would be flooded.

f. Earl Chamness, Plant Engineer, Quincy Soybean Company, said that based on the potential damage in South Quincy Drainage and Levee District, the levees should be upgraded to industrial levee standards. He indicated that his company would cooperate in any way possible with the study effort.

g. LeRoy Willer, Plant Facilities Manager, Gardner-Denver Company, stated that he does not think that the Standard Project Flood design is realistic for the Quincy area because he does not think the river would ever reach that level. He advocated the 200-year frequency design level, and elimination of the line of protection around the South Side Boat Club.

h. Matthew A. Hutmacher, attorney for the South Quincy Drainage and Levee District, indicated the Drainage District Commissioners would review the alternatives and make their recommendations in the near future.

8. A general question and answer period followed the statement period.

7. The meeting was concluded by Mr. Schmerr stating that the Corps of Engineers would consider the input received at the meeting in our future studies.

8. Attendees at the meeting were furnished survey sheets listing the alternatives discussed and were asked to indicate their preference of the alternatives. Fourteen survey sheets were returned. The combination protective works for Quincy and South Quincy Drainage and Levee District was the alternative favored by most persons. Two persons indicated a preference for "no additional Federal action" at Quincy.

9. A letter received after the meeting from the attorney for South Quincy Drainage and Levee District indicated that the District commissioners' preferences were:

a. Combine the levee of City of Quincy and South Quincy Drainage and Levee District.

b. Improve levees - riverside fill, South Quincy.

c. Improve levees - landside fill, South Quincy.

The commissioners also strongly oppose the concept of ring levees for the commercial and industrial areas of South Quincy Drainage and Levee District due to severe reservations concerning the legality of such a "split-off" from the District.

10. Another letter received following the meeting from Mr. LeRoy Willer, Plant Facilities Manager, Gardner-Denver Company, proposed an alternative plan of improvement for the Curtis Creek area. The plan consists of realignment of Curtis Creek to the south of the Gardner-Denver Company property, and provision of a new highway and railroad bridge.

11. Based on input received as a result of the alternatives workshop meeting, it appears that the most practical and socially acceptable alternatives are those alternatives that involve raising all of the levees in South Quincy Drainage and Levee District, and construction of new levees and floodwalls in the City of Quincy, either individually or in combination.

12. The Corps of Engineers will now proceed with detailed studies of those alternatives. The studies will include an analysis of the interior drainage requirements, a study of environmental quality measures, a study of the effects on adjacent areas of raising the levees, detailed cost and benefit analysis, and a detailed assessment and evaluation of the environmental, social, and economic impacts of the alternatives considered. Impacts of alternatives will be compared with the existing and projected condition with no additional program to reduce flood damages.

13. Coordination with interested agencies and individuals will continue during the detailed study period in an effort to be responsive to the needs of the area, and to formulate a program for flood damage reduction that is practical and acceptable to the concerned publics.

14. Another public meeting to present the findings will be held following completion of the detailed studies. The public will again be requested to participate in the formulation of a final plan for recommendation by providing their views and comments.

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Illinois Department of Conservation
life and land together

605 STATTON BUILDING • 400 SOUTH SPRING STREET • SPRINGFIELD 62706
[illegible]

May 19, 1980

Mr. Doyle W. McCulley
Department of the Army
Rock Island District Corps
Clock Tower Building
Rock Island, IL 61201

RE: Survey of the City of
Quincy and South Quincy
Levee Drainage Districts
Adams County, Illinois

Dear Mr. McCulley:

This letter is to inform you that the Department of Conservation has reviewed the two archaeological survey reports which you sent to the Department of Conservation. Our comments concerning each of the reports are as follows:

(1) The Archaeological Significance of the Quincy, Illinois, Flood Study Area

This report concluded that the Quincy Flood Study Area not only contains known archaeological sites but also has a high potential for containing additional sites which have not yet been discovered. If the archaeological sites within the project area are to be disturbed, plans for mitigation should be submitted. A specific recommendation of the survey report was that those areas of the project site which are thought to have a high potential for containing archeological sites should be tested to determine if this is indeed the case. This recommendation should be implemented before construction begins.

(2) An Archaeological Survey of the South Quincy Drainage and Levee District, Levee Improvement Project, Adams County, Illinois

This survey covered approximately 200 acres of the Mississippi River floodplain and found that no important cultural resources were present in this area which might be damaged by the South Quincy Levee Project. The Department of Conservation agrees with this assessment of the archaeological potential of the project area and our position is that the project will have no affect on historic, architectural or archaeological sites in the area.

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If you have any further questions concerning this matter, please contact me.

Sincerely,

Mark Wagner
National Register Archaeologist

MW/1SA

United States Department of the Interior
HERITAGE CONSERVATION AND RECREATION SERVICE
MID CONTINENT REGION
POST OFFICE BOX 25387
DENVER FEDERAL CENTER
DENVER COLORADO 80225

IN REPLY REFER TO

1201-05(W530)

JUN 05 1980

Mr. Doyle W. McCully
Chief Engineering Division
Department of the Army
Rock Island District
Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Att: Mr. Roy Eichhorn

Dear Mr. McCully:

In response to your request of May 5, 1980, we have completed our review of "An Archaeological Survey of The South Quincy Trainium and Levee District, Levee Improvement Project, Adams County, Illinois." Enclosed please find a copy of the single reviewer's comments.

The review is generally favorable. It is recognized that the survey was conducted under the "State of the Art" for that period. However, results are well presented, and are supportable. It is our opinion that the archeological information of the report is adequate for the present level of project planning.

Thank you for allowing us to review this report; we trust that our comments prove useful.

Sincerely,

[illegible]
Chief, Interagency
Archeological Services - Denver

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
ROCK ISLAND FIELD OFFICE (ES)
4848 Second Avenue Second Floor
Rock Island Illinois 61201

IN REPLY REFER TO
Commercial: 309 793 5800
FTS 958-5800

July 15, 1981

Colonel Bernard P. Slofer
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Slofer:

This is our draft fish and wildlife report for Stage 3 of the South Quincy Drainage and Levee District in Adams County, Illinois. It has been prepared under the authority of and in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. 661 et seq.). The preparers include Jody Gustitus, Fish and Wildlife Biologist, and Thomas Groutage, Field Supervisor, both of the Rock Island Field Office, Rock Island, Illinois. By copy of this letter, the Illinois Department of Conservation is requested to review and comment.

In letters dated February 6, 1976 and April 8, 1976, we submitted our planning aid comments on this project. Since that time, an updated planning aid meeting was held. A summary of our concerns expressed at the meeting was submitted in a letter dated May 13, 1980. The current Stage 3 project alternatives are basically the same as those presented at the December 20, 1976 "Alternatives Workshop". The alternatives being studied are:

1. Raise the existing levee with sand borrow from the river.
2. Raise the existing levee with clay borrow.
3. Construct a new ring levee around the commercial and industrial area at the north end of the drainage district.
4. Evacuate the floodplain.
5. No additional federal action.

This report is an analysis of the Stage 3 alternatives and their impacts on fish and wildlife resources. Information furnished on the resources of the project area is based on our staff field inspection, on the contractor's April 1981 report, "Environmental Resources Inventory, South Quincy Drainage and Levee District" and on personal communications with local residents. For a

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detailed description of the project area, please refer to the contractor's report.

Description of the Project Area

For the purposes of this report, the project area is defined as the area within the existing levee system. This includes approximately the area landward from Mill Creek to the south, along Goose Island side channel and Texas Chute to the west with Curtis Creek as the northern border (see attachment 1). The levee system ties off near the bluffs and Illinois Highway 57. The subarea will be discussed separately.

The project area incorporates approximately 9 square miles. Of this, about 10 percent constitutes deciduous forest, 7.5 percent comprises surface waters. The largest use category is cropland and pasture with about 61 percent of the area. Probably no more than 200 residents live in the project area. Industrial and commercial use is concentrated in the northeast corner within the subarea.

Fish and Wildlife Resources of the Project Area

Forested sloughs (referred to above as deciduous forests and surface waters) are found primarily in the central and south-central regions of the project area. Trees present besides the typical bottomland species of cottonwood, silver maple and willow include green ash, sugarberry, black cherry, eastern redbud, shagbark hickory and several types of oaks. These tree species provide the overstory that surrounds a narrow buttonbush scrub-shrub wetland zone. This, in turn, surrounds an emergent herbaceous wetland. Aquatic vegetation occurring in the wetlands includes American lotus, scouring rush, wild water pepper, duckweed, American pondweed, arrowleaf and common cattail.

Forested sloughs provide habitat relatively unique to the area. The overstory trees include mast and fruit bearers infrequently found in the floodplain of Pool 22. They are an important food source for resident and migratory song bird populations and squirrels. Wild turkeys, once stocked here have since been hunted out. Wood ducks, pileated woodpeckers and prothonotary warblers use the cavities of the overstory trees for nesting. Five prothonotary warbler nesting boxes have been placed around Big Lake by a local Audubon Society member. When checked this spring, all boxes contained successfully nesting pairs of prothonotary warblers. The overstory trees also provide benefits to the wetland. Leaf litter provides a nutrient source. Fallen branches provide shelter and habitat diversity. In places where trees overhang the slough, shade protects the water from the sun's warmth and fallen insects provide food for fish and herpetiles.

Typically, an intermediate scrub-shrub zone dominated by buttonbush lies between the overstory trees and the slough. Furbearers such as mink and beaver require cover when traveling to and from the water. The scrub-shrub zone provides this cover. It also provides food and cover for rabbits (locally important for hunting), nesting habitat for birds such as the green heron and browse for white-tailed deer.

Many of the sloughs are palustrine emergent wetlands dominated by American lotus, cattail or smartweed. The sloughs were formed as backwaters of the Mississippi

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River. Levee construction cut off their union with the river. Subsequent siltation has reduced their depth. These factors have contributed to a decline in fishery quality. However, many people appear to fish the sloughs regularly. At least five people were observed fishing in different places during our mid-week field inspection. Cabins and boats also suggest human use of the sloughs. Fish species likely to be caught include sunfish, bullheads and rough fish.

The sloughs provide food and shelter for many species of animals. Mallards feed on acorns, coontail and seeds of smartweed and buttonbush. Ducks for the Future, a local wildlife organization, stocked 250 ducklings in Sand Lake this spring. Wood ducks up to six weeks of age feed primarily on insects after which vegetable matter is consumed including sago pondweed, algae, duckweed and primarily acorns. Local residents recall large populations of wood ducks with reduced breeding populations still present. Flycatchers feed on insects near the slough, kingfishers dive for little fish, great blue herons (observed in the area) stalk fish and frogs. Rails, ducks, shorebirds and marsh wrens nest in the emergent vegetation. Turtles, frogs, salamanders, furbearers and small mammals also feed and seek cover in the slough area.

Croplands provide food as waste grain and corn stubble for wood ducks and mallards, bob-white quail, white-tailed deer and small mammals. Croplands provide the greatest benefits when associated with natural cover like the forested sloughs.

The developed industrial area has poor wildlife habitat and in some places virtually no habitat exists.

We anticipate that the future without project construction for the South Quincy Drainage and Levee District will be similar to present conditions. Industrial or commercial enterprises may expand farther south and west but it appears unlikely they would come close to the forested sloughs of the south-central part of the district. The forested sloughs are apparently too wet to farm and will likely remain so. The drainage district may see more recreational use over the next fifty years.

Description of the Subarea

The South Quincy Subarea encompasses about 420 acres and lies in the northeast corner of the drainage district. It is bounded by Curtis Creek to the north, Illinois Highway 57 to the east for 1.7 miles, turning riverward one-half mile as the southern border, and meeting Curtis Creek about one-half mile downstream of its juncture with Highway 57 to form the western border (see attachment 1). Cropland and pasture comprise about 74 percent of the subarea. Other land uses are residential - 13 percent, strip mines, quarries and gravel pits - 11 percent and transportation, communications and utilities - 3 percent.

Fish and Wildlife Resources of the Subarea

The forested sloughs found in the central and south-central regions of the drainage district are absent from the subarea. The contractor identified a small drainage ditch-type stream and a seepage pond about 2 acres in size-as

the only surface water resources occurring in the subarea. The stream has limited aquatic resources. It banks provide marginal cover for small mammals, some herpetiles and birds. The small seepage pond was not found. The field inspection by our staff showed only cropland where the pond was supposed to be. We did, however, observe a disturbed wetland in the northwest corner of the subarea.

The future of the subarea without project construction will likely be similar to existing conditions. More industrial and commercial enterprises may enter the subarea. However, subarea expansion will likely not occur as rapidly without project construction as with it.

Endangered Species - Project Area and Subarea

Bald eagle (Haliaeetus leucocephlus) perching and roosting sites in the area have been identified by G.H. Schneider and A.F. Pogge in their "Preliminary Report on Birds of Adams County, Illinois and Marion County, Missouri, Related to the Quincy Bridge Replacement (U.S. 24)." Two perching areas were found on Ward Island adjacent to the drainage district (see attachment 2). Orton and Fabius Islands, directly across the river from Ward Island, were identified as eagle roosting areas.

Regarding the presence of the Higgin's eye nearly mussel (Lampsilis higginsii), the contractor stated in the environmental report, "No freshwater mussels listed on the Federal List of Rare and Endangered species have been recently reported as occurring in the vicinity of this study area. No federally listed species of mussels were collected as part of this study." Attachment 3 lists the endangered species that may be found in the project area.

Structural Alternatives Levees

1. Raise the existing levee with sand borrow from the river

The existing agricultural levee provides protection for a flood occurance of once in 50 years. The additional protection is proposed for a flood occurance of about once in 200 years. It would be constructed hydraulically by pumping sand from the river to the landward side of the existing levee. After de-watering, the sand would be graded to a 4 to 1 slope. The new levee base would extend an additional 50 feet landward. Ponding would likely be supplied by existing sloughs within the district.

2. Raise the existing levee with clay borrow

The proposal to raise the existing levee with clay borrow would also provide protection against a once in 200 years flood. The proposed construction would place fill riverward of the existing levee at a 3 to 1 slope. The base would extend an additional 35 feet. The fill material may be taken from a bluff borrow site. It may also be feasible to excavate borrow from within the drainage district. Ponding would likely be supplied by existing sloughs within the district.

3. Construct a new ring levee around the commercial and industrial area at

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the north end of the drainage district.

The proposed ring levee would be constructed at the 200-year flood level. There is no existing levee. The base of the proposed levee would be approximately 110 feet wide. Borrow would be taken from a bluff borrow site or from land within the drainage district. The subarea is too far from the river to obtain sand hydraulically. Ponding area proposals have not yet been identified.

Non-Structural Alternatives

Evacuation of the floodplain and no additional federal action are alternatives also being considered for the South Quincy Drainage and Levee District. Evacuation of the floodplain would require removal and relocation of the affected industrial, commercial and residential interests. No additional federal action would leave flood control a local or private issue.

Impacts of the Alternatives on Fish and Wildlife Resources

1. Raise the existing levee with sand borrow from the river

Sand borrow dredged from the river would remove those benthic organisms directly affected. Adjacent benthic communities may be buried due to increased turbidity. When dredging alternatives have been selected, a determination should be made concerning the quality of the benthic communities to be directly and indirectly impacted.

Dredging the river for sand borrow could enhance the aquatic resource. Many of the backwaters and side channels of the area are filling in with sediment. Dredging and deepening these waters would increase the water volume and consequently the water quality. The slack water habitat provides feeding and spawning areas for fish and feeding and resting areas for water-related birds. Though the top part of the substrate may be silt, it is likely that much usable sand lies underneath. The silt can be disposed in the nearby farm fields or preferably stored and graded over the sand for seeding purposes. Our Mark Twain Refuge staff at Quincy recommended two side channels that could be improved by dredging. These are the Beebe Island and the Fabius Island side channels. Beebe Island side channel reportedly contains mostly all sand and little silt. Texas Chute landward of Ward Island could also be improved through dredging. The GREAT II Side Channel Work Group recommendations should be consulted when borrow areas are being determined (see attachment 4).

To raise the levee with sand, the existing levee base would be increased approximately 50 feet landward. For the greater portion of the levee district, this would not result in significant impacts. However, Sand Slough lies along the base of the existing levee near the mouth of Mill Creek. Raising the levee along Sand Slough would encroach into hardwood forest and palustrine emergent wetlands. Another slough lies near the levee base at river mile 321.9. Approximately 8 acres of the forested slough habitat would be required for levee expansion. The filling would change an already diminishing (as evidenced by adjacent drainage and levee districts) and valuable resource to a monotypic grass habitat of marginal value.

The most significant impact resulting from raising the levee may be increased land values and subsequent increased demand for land. With flood protection increased to the 200-year flood level, both industry and agriculture may find expansion within the drainage district more appealing. Removing the forests around the sloughs would severely reduce the sloughs' benefits to fish and wildlife. Tree removal would increase solar heating in the wetland and erosion and sedimentation while decreasing nutrient input, habitat diversity, and species numbers and types. Thus, even though actual filling of the sloughs would require a 404 permit, much of their value would be lost if the surrounding trees were cleared.

Increasing the levee height may raise flood heights. The cumulative impact of many levees along the river may be the virtual channelization of the river. This is due to increased scouring from increased velocity and flood flows.

2. Raise the existing levee with clay borrow

Clay fill used to raise the levee height would be placed riverward of the existing levee. Since clay can be graded to a steeper slope than sand (3 to 1 rather than 4 to 1 or 5 to 1), the increased levee base would be approximately 35 feet rather than 50 feet. The land riverward of the levee contains bottomland hardwoods and sloughs. Constructing a clay addition to the existing levee would require approximately 50 acres of bottomland hardwoods with about 20 acres of that being slough habitat. The loss of bottomland hardwoods and sloughs is significant in its cumulative effects on the Upper Mississippi River ecoregion and its direct effects on fish and wildlife inhabiting the area.

Clay borrow would be taken from either an established borrow site or from nearby agricultural fields. Areas most advantageous for borrow would likely not be prime wildlife habitat areas. However, habitat quality of the borrow area should be determined when alternative sites have been selected.

As discussed under impacts of the first alternative, increasing flood protection may increase the demand for land within the drainage district. This may encourage encroachment into the forested sloughs. Higher levees may also increase flood heights and river scouring.

3. Construct a new ring levee around the commercial and industrial area at the north end of the drainage district.

The base for the new levee would be approximately 110 feet wide. The land the levee would cover and protect is agricultural or industrial and commercial. Levee construction should not result in significant terrestrial impacts.

Several drainage ditches and a disturbed wetland are the aquatic resources that would be impacted. The disturbed wetland is located near the north junction of the proposed subarea levee with the existing drainage district levee. The wetland may be filled due to levee construction. Though the wetland is of marginal quality due to nearby developments, it still affords some wetland values. The value of the drainage ditches to fish and wildlife appears to be limited.

Construction of the subarea levee should not significantly constrict the floodplain. The proposed levee appears to be set far enough back from the river to not raise flood heights or cause additional scouring of the river.

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4. Non-structural alternatives

Floodplain evacuation could result in large benefits to fish and wildlife resources and recreation. Removal of the affected homes and businesses could allow use of the floodplain for active and passive recreation and fish and wildlife habitat. Floodplain evacuation would also preserve the natural flood storage function of the floodplain. No federal participation would eliminate the negative and positive impacts resulting from levee construction, unless the project was funded through other sources.

Ranking of the Alternatives

Floodplain evacuation is the preferred alternative. Floodplain evacuation rather than levee construction appears to more fully support Executive Order 11988 - "Floodplain Management". The Executive Order states as its objective, "...to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative..." Implementation of floodplain evacuation would eliminate the adverse impacts associated with levee construction. These include loss of deciduous forested wetland habitat and increased scouring and flood heights due to the constriction of the river by the presence of levees in the floodplain. Beneficial flood storage values of the floodplain would be retained. Fish and wildlife habitat and recreation could be enhanced.

The second preferred alternative is no federal action. No federal action would not encourage floodplain development.

The third preferred alternative is construction of a levee around the subarea. Levee construction may contain industrial and commercial expansion within the subarea. It should also not significantly constrict the floodplain.

The fourth preferred alternative is expansion of the existing agricultural levee with sand borrow. Fisheries resources could be enhanced through dredging heavily sedimented side channels and backwaters.

We strongly discourage raising the existing agricultural levee with clay borrow, the fifth preferred alternative. Approximately 50 acres of bottomland hardwoods would be lost because of riverside placement of borrow. Development within the drainage district would be encouraged. Little opportunity exists for enhancement.

Recommendations for Fish and Wildlife Trade-Offs

The non-structural alternatives would require no fish and wildlife mitigation. To minimize damage to fish and wildlife resources from structural alternatives, we recommend the following measures be included in the project plans:

Preferred Alternative 3: Construct a new ring levee around the subarea.

Mitigation:

1. Fill in the disturbed wetland will require in-kind mitigation within the drainage district for the number of acres filled.

Enhancement:

1. Borrow sites, if located within the drainage district, should be enhanced for fish and wildlife purposes.

2. Do not mow the levee until after August 1 each year.

Preferred Alternative 4: Raise existing levees with sand borrow from the Mississippi River.

Mitigation:

1. Loss of about 2-4 acres of wetland/slough habitat will require in-kind mitigation within the drainage district for the number of acres filled.

2. Loss of 3-5 acres of bottomland hardwoods will require in-kind mitigation for the number of acres lost within the drainage district. Bottomland hardwood replacement should include planting trees and shrubs beneficial to wildlife (like mast or fruit producers). Replacement could be satisfied by planting approximately one mile of buffer at least 50 feet wide along the inside (landward) toe of the levee (see attachment 5).

3. All the forested sloughs within the levee district should be permanently protected from cutting, burning, draining or filling through zoning, easements or some other means.

Enhancement:

1. Sand borrow from the river should be taken from Beebe Island side channel, Texas Chute, possibly Fabius Island side channel, or other locations recommended by the GREAT II Side Channel Work Group to enhance the aquatic resources.

2. Silt from the dredging should be stored and then graded over the finished levee to provide a substrate for seeding desirable grass or plant species.

3. Do not mow the levee before August 1 of each year.

Preferred Alternative 5: Raise the existing levee with clay borrow.

Mitigation:

1. Loss of about 20 acres of wetland/slough habitat will require in-kind mitigation within the drainage district for the number of acres filled.

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2. Loss of about 30 acres of bottomland hardwoods will require in-kind mitigation for the number of acres lost within the drainage district. Bottomland hardwood replacement should include planting trees and shrubs beneficial to wildlife (like mast or fruit producers).

3. All the forested sloughs within the levee district should be permanently protected from cutting, burning, draining or filling through zoning, easements or some other means.

Enhancement:

1. Borrow sites, if located within the drainage district, should be enhanced for fish and wildlife purposes.

2. Do not mow the levee before August 1 each year.

Sand or clay borrow site selection and enhancement, wetland/slough and bottomland hardwood mitigation measures should be coordinated with the Illinois Department of Conservation and this office.

We appreciate the assistance provided by your staff. If there are any questions regarding our recommendations, please contact us. We expect to submit our final report in December 1981.

Sincerely,

Thomas M. Groutage

Thomas M. Groutage
Field Supervisor

Enclosures

cc: Illinois Department of Conservation (Lutz, Bertrand)
Illinois Environmental Protection Agency
U.S. Environmental Protection Agency (Chicago)
U.S. Fish & Wildlife Service (RCAO, RO-RA)

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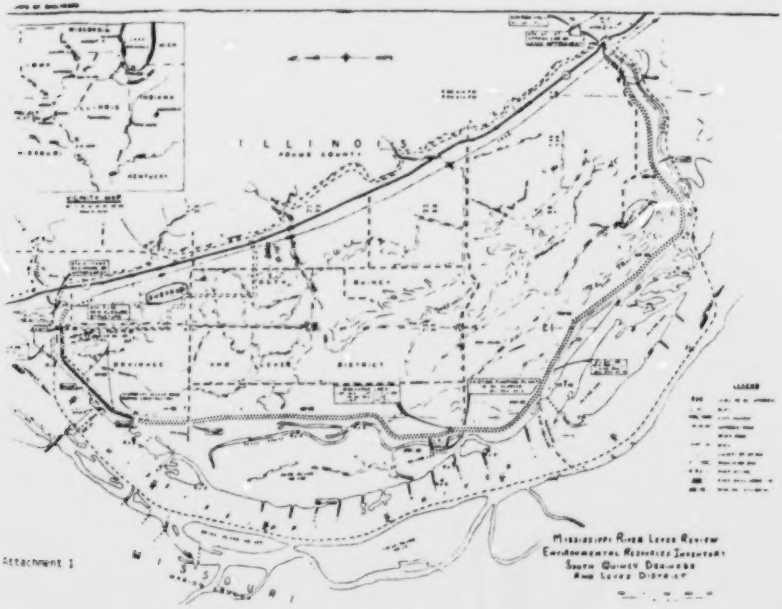

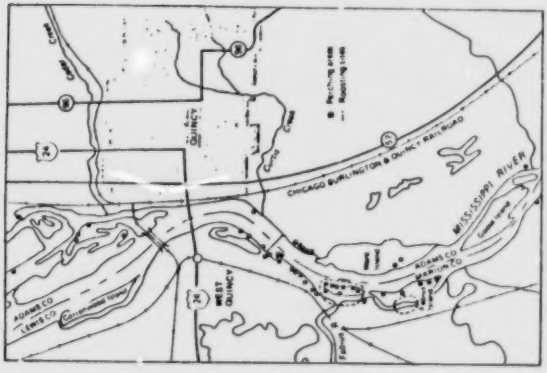

Figure 9.3 Road maps and golden copy sketching and rendering (ca. February 1988 (from Schroeder and Poppe 1988)

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SECTION 7 CONSULTATION
A General Review

Introduction

Sections 7(a) and (b) of the Endangered Species Act of 1973, as amended, require the Federal agency to consult with the U.S. Fish and Wildlife Service (Service) when the Federal agency's action may affect listed species or critical habitat and requires the Service to prepare a written statement. This statement is our Biological Opinion. Formal consultation will be initiated by submitting a written request to the Area Manager, U.S. Fish and Wildlife Service, 2701 Rockcreek Parkway, Suite 106, North Kansas City, Missouri 64116.

Section 7(d) prohibits Federal agencies and applicants from making any irreversible or irretrievable commitment of resources during the consultation period which in effect would deny formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

It is extremely important for all Federal agencies to review and understand the Endangered Species Act, as amended, which governs the Section 7 consultation process. This document is available through the Area Office if you need additional copies.

Procedures

The Endangered Species Act of 1973, as amended, has resulted in two consultation procedures for Federal agencies. The differences between the procedures hinge on the type of project proposed.

I. Construction Projects

A construction project is defined to include only those construction activities that are major Federal actions significantly affecting the quality of the human environment and which result in the building, erection or maintenance of structures such as dams, buildings, roads, pipelines and channels. This includes major non Federal authorization or approval. These projects are those which require the preparation of an EIS. For construction projects, Federal agencies, or the designated non Federal representative, should obtain a list of endangered, threatened and proposed species from F&S that may be present in the area of the action. If endangered species are present, a Biological Assessment must be prepared to identify those species that are likely to be affected by the proposed action. The draft regulation does allow the preparation of the Biological Assessment prior to receiving a list of species from the Service. The agency or its representative is required to verify its list with the Service. If it is determined that a listed species may be affected, the agency must initiate formal Section 7 consultation.

A Biological Assessment is required for all major Federal actions. It is designed to provide early discovery of impacts by determining whether any listed species present is likely to be affected, or whether the agency is likely to jeopardize the continued existence of a proposed species or result in the destruction or adverse modification of critical habitat. The biological assessment will assist the Service in developing a more thorough and timely biological opinion.

When conducting a Biological Assessment, the following steps should be taken:

a. Conduct an on-site inspection of the area affected by the proposed activity or program, which may include a detailed survey of the area to determine if species are present or may be present during other seasons and whether suitable habitat exists for either expanding the existing population or potential reintroduction of populations.

b. Interview recognized experts on the species at issue, including those within the Service, State conservation departments, universities and others who may have data not yet found in scientific literature.

c. Review literature and other scientific data to determine the species' distribution, habitat needs and other biological requirements.

d. Review and analyze the effects of the proposal on the species, in terms of individuals and populations, including consideration of the cumulative effects of the proposal on the species and its habitat.

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e. Analyze alternative actions that may provide conservation measures.

f. Conduct studies necessary to fulfill the above requirements.

g. Review any other relevant information.

These projects are considered major construction actions:

1. Power plant sites and major transmission corridors
2. Dams and modifications (power add-on, new locks)
3. Bridge construction, repair or removal
4. Major levee and drainage projects
5. Pipelines
6. Channels
7. Major wastewater treatment facilities - EPA
8. Watershed projects - SCS (PL-566)
9. Highways

II. Other Projects and Action (Non-Construction Projects)

The second category includes all actions authorized, funded or carried out by Federal agencies that are not considered a major action. The projects may involve construction activities, but they will not significantly affect the quality of the human environment. It is recognized that some Federal activities which do not involve construction do require the preparation of an EIS. For purposes of the Endangered Species Act, such projects are handled as non-construction projects. It is not a requirement for the Federal agency or its representative to request a list of species, or prepare a biological assessment. The Service will provide a list of species if it has specific concern regarding the project's possible effects on endangered species. The Service suggests that a biological assessment be prepared for all actions that may be controversial, or which the Federal agency may seek an exemption. Federal agencies have an obligation to review their actions to determine whether those actions may affect listed species or their critical habitat. The agency's final conclusion should be stated in the FONSI. If a listed species may be affected, the agency must initiate formal Section 7 consultation. The Area Manager reserves the right to (1) request that an agency prepare a Biological Assessment, and (2) request an agency to enter into consultation.

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These type projects will be considered non-construction when they do not meet the requirements as a major project:

1. Dredging - sand and gravel
2. Barge fleeting (loading and unloading)
3. REA transmission lines and substations
4. Wastewater treatment facilities
5. SCS - watershed projects
6. River channel maintenance dredging
7. OSM - land reclamation of old strip mine sites
8. OSM - new strip mines and expanding operations

There are many specific examples of non-construction projects that have conflicted with endangered species. We have provided a few to clarify this section.

1. Sand and Gravel Dredging - The Meramec and Osage Rivers have populations of the Pink mucket pearly mussel (Lampsilis orbiculata orbiculata). Sand and gravel dredging is seen as a threat to endangered mussels.

2. Strip Mining - Coal mining companies continually want to expand their operations by relocating small streams in southern Illinois. Galum and White Walnut Creeks, Perry County, Illinois were both surveyed for the presence of the Indiana bat and bats were found to be using the area.

3. Barge Fleeting - Barge fleeting areas are being developed all along the Mississippi River. These areas often conflict with mussel beds and Higgins' eye pearly mussel (Lampsilis higginsi) which possibly may be found in the bed.

DEFINITIONS:

Technical Assistance - Information provided to State or private interest groups concerning Federally listed, threatened or endangered species.

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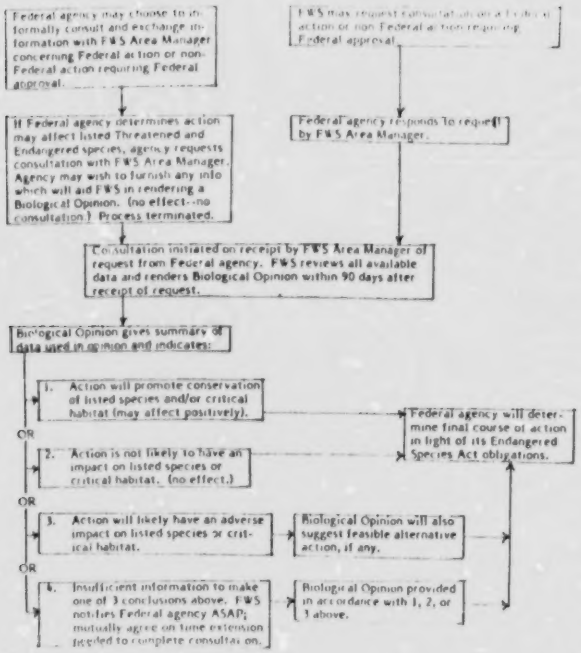
CONSULTATION PROCEDURES FOR OTHER PROJECTS AND ACTIONS


Federal agency may choose to informally consult and exchange information with FWS Area Manager concerning Federal action or non-Federal action requiring Federal approval.
FWS may request consultation on a Federal action or non-Federal action requiring Federal approval.
If Federal agency determines action may affect listed Threatened and Endangered species, agency requests consultation with FWS Area Manager. Agency may wish to furnish any info which will aid FWS in rendering a Biological Opinion. (no effect--no consultation.) Process terminated.
Federal agency responds to request by FWS Area Manager.
Consultation initiated on receipt by FWS Area Manager of request from Federal agency. FWS reviews all available data and renders Biological Opinion within 90 days after receipt of request.
Biological Opinion gives summary of data used in opinion and indicates:
1. Action will promote conservation of listed species and/or critical habitat (may affect positively).
OR
2. Action is not likely to have an impact on listed species or critical habitat. (no effect.)
OR
3. Action will likely have an adverse impact on listed species or critical habitat.
Biological Opinion will also suggest feasible alternative action, if any.
OR
4. Insufficient information to make one of 3 conclusions above. FWS notifies Federal agency ASAP; mutually agree on time extension needed to complete consultation.
Biological Opinion provided in accordance with 1, 2, or 3 above.
Federal agency will determine final course of action in light of its Endangered Species Act obligations.

Informal Consultation - Information provided to Federal agency or its designated Federal representatives concerning Federally listed species that may occur in a project area. This includes, but is not limited to, identification of species which may be in the area, biological assessments and discussions on other relevant topics.

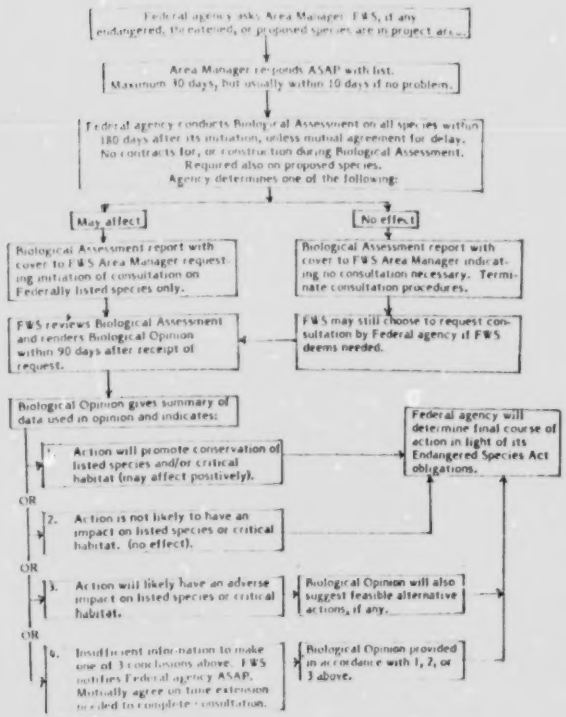
Formal Consultation - That part of the consultation process which the Federal agency initiates after it is determined that its action may affect listed species or critical habitat. The formal consultation stage is initiated by a written request and terminated with the issuance of a Biological Opinion from the Service.

Reasonable and Prudent Alternatives - Courses of action open to the Federal agency that are technically capable of being implemented and consistent with the intended primary purpose of the activity, which would avoid jeopardizing the continued existence of listed species, or destruction or adverse modification of Critical Habitat.

Proposed Species - Any species of fish, wildlife or plant that is proposed to be listed under Section 4 of the Act.

Listed Species - Any species of fish, wildlife or plant which has been determined to be endangered or threatened under Section 4 of the Act.

CONSULTATION PROCEDURES FOR CONSTRUCTION PROJECTS


Federal agency asks Area Manager, FWS, if any endangered, threatened, or proposed species are in project area.
Area Manager responds ASAP with list. Maximum 30 days, but usually within 10 days if no problem.
Federal agency conducts Biological Assessment on all species within 180 days after its initiation, unless mutual agreement for delay. No contracts for, or construction during Biological Assessment. Required also on proposed species. Agency determines one of the following:
May affect
No effect
Biological Assessment report with cover to FWS Area Manager requesting initiation of consultation on Federally listed species only.
Biological Assessment report with cover to FWS Area Manager indicating no consultation necessary. Terminate consultation procedures.
FWS reviews Biological Assessment and renders Biological Opinion within 90 days after receipt of request.
FWS may still choose to request consultation by Federal agency if FWS deems needed.
Biological Opinion gives summary of data used in opinion and indicates:
1. Action will promote conservation of listed species and/or critical habitat (may affect positively).
OR
2. Action is not likely to have an impact on listed species or critical habitat. (no effect).
OR
3. Action will likely have an adverse impact on listed species or critical habitat.
Biological Opinion will also suggest feasible alternative actions, if any.
OR
4. Insufficient information to make one of 3 conclusions above. FWS notifies Federal agency ASAP. Mutually agree on time extension needed to complete consultation.
Biological Opinion provided in accordance with 1, 2, or 3 above.
Federal agency will determine final course of action in light of its Endangered Species Act obligations.

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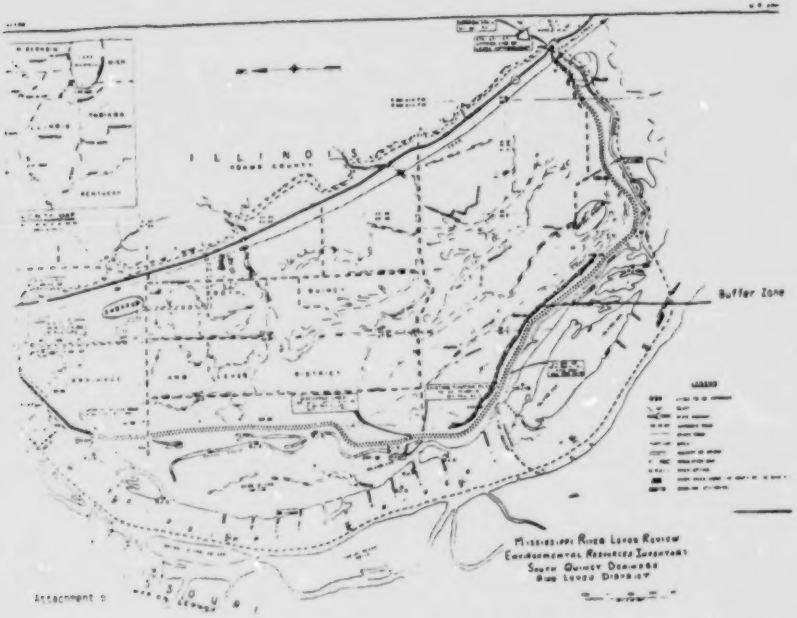

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Figure 50. Side channel problem areas (see Table 5).
From: The GREAT II Side Channel Work Group Appendix

Attachment 4

Figure 51. Side channel problem areas (see Table 5).
From: The GREAT II Side Channel Work Group Appendix

II-110

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UNITED STATES GOVERNMENT

memorandum

DATE June 2, 1980

SUBJECT Review of An Archeological Survey of the South Quincy Drainage and Levee District, Levee Improvement Project, Adams County, Illinois.

TO Supervisory Archeologist Hoffman JH

Several preliminary remarks need to be made before getting into the review. First, this is not a recent survey, dating early 1976; hence the format is not one we use most frequently and the content may not be as complete as we see today. Second, we do not have a Scope-of-Work to go with the report. We must assume that an intensive inventory was intended or required.

For an early survey, I find this report to be brief, but one of the more explicit reports I have read. We are told where the survey was, why it was necessary, the field conditions, topographic setting, and that subsurface testing techniques were used when the surface was obscured. We might have liked to know distance between surveyors but as there were two people doing a survey totalling 100 feet wide, this may be inferred. Additionally it would be nice if the two-man survey crew were named. The crockery, ceramics, glass, etc. from the historic house might have been analyzed to identify age and historic records might have been utilized to identify the occupant of the house. The author apparently believes the house is recent. The state site file should have been consulted regarding known sites in the area.

However, these are minor problems. I believe the survey is responsible and I agree that the South Quincy Levee Improvement project will damage no known significant cultural resources.

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
2701 Rockcreek Parkway, Suite 104
North Kansas City, Missouri 64116

KANSAS CITY AREA OFFICE
816/374-6166

ECOLOGICAL SERVICES
816/374-3931

July 15, 1981

OFFICIAL LISTING OF ENDANGERED SPECIES
For Major Construction Projects

This is in response to your letter of June 1981 regarding the proposed South Quincy Drainage and Levee District project in Adams County, Illinois.

In accordance with Section 7(c) of the Endangered Species Act, as amended, we have reviewed the project information and our Endangered Species distribution information, and we have determined that the following listed species may occur in the project area.

Listed Species

Bald eagle (Haliaeetus leucocephalus)

Proposed Species

None

The bald eagle is a winter resident in the project area. Wintering eagles are commonly encountered below the river's lock and dams where open water and a plentiful food supply exist. A special study by Messrs. Oaldiek, Peggs and Schneider on the Quincy Bridge replacement during the winter of 1979-80 shows approximately 20 eagles between River Miles 318 and 326. The study shows two day perch sites on Ward Island near River Mile 323 and five additional perch sites near River Mile 324. Numerous perch sites were also identified on the west river bank from River Mile 321 to 323. Two night roost areas have also been identified on Orton and Fabius Islands.

Section 7(c) of the Act also requires that you prepare a biological assessment to determine if the proposed project "may affect or will not affect" listed and proposed species, or jeopardize the continued existence of a proposed species or result in the destruction or adverse modification of critical habitat. You should send the final biological assessment to the Area Office and a copy to the Ecological Services field office working on the project. If you determine that the project may affect listed species, you should initiate formal consultation.

Enclosed you will find a supplementary list describing major responsibilities required of Federal agencies under the Endangered Species Act of 1973, as amended.

If there are any questions regarding the biological assessment or how it applies to the consultation process, please contact Mr. Larry Visscher at the Kansas City Area Office, 816/374-6166 (FTS: 758-6166).

Attachment 1

Thank you for your interest and cooperation in conserving endangered species. If we can be of further assistance, please contact us.

Sincerely yours,

Tom A. Saunders
Area Manager

Enclosure

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February 19, 1982

Colonel Bernard P. Slofer, District Engineer
Corps of Engineers, U. S. Army
Rock Island District
Clock Tower Building
Rock Island, Illinois 61201

Re: South Quincy Drainage District
Levee Project

Dear Colonel Slofer:

The South Quincy Drainage District has become aware that Alternate Plans are being studied by the Corps of Engineers for supplemental or increased flood protection to the District by the Survey Authority, "Mississippi River Coon Rapids Dam to Ohio River, Levee Projects Review."

The District has learned of these plans through its association with the C.O.E. through preliminary studies shown District officials some years ago and has knowledge of the possibility of serious consideration being made of a "ring levee" protecting industries only as one of the alternatives.

The District wishes to reaffirm its desire for additional flood protection and has a continuing strong interest in accomplishing that end. However, the District is reluctant to participate in the construction of a ring levee to only protect existing industry for many reasons:

1. Such a levee would disrupt the Capital Improvement and Maintenance Tax base of the District, which now functions through a Court Order based upon benefits received proportionally to each tract of land within the District.

2. There is a serious legal question whether or not a portion of an Illinois Drainage District can be severed from the District, thereby rendering the balance of the District unfeasible to operate and maintain; or at best place an undue hardship on the remaining portion.

3. The interior drainage system would need revision and require Court Approval before implementation. This could be a long drawn out process and involve damages as well as benefits.

4. Local interests do not consider a ring levee socially or economically acceptable.

5. The Drainage District would be opposed to participating in a Standard Project Flood Levee (S.P.F.) as a ring levee at this time for the above reasons.

6. The District would have reservations in participating in a (S.P.F.) levee around the entire District even though

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it might be feasible on a benefit/cost ratio because of the probable right-of-way costs and the possible Sponsor's burden of construction cost sharing now under consideration but not yet determined. Firm information would be needed for a final decision.

7. The District will give full hearted support to a Main Stem levee project based upon 500 year flood protection plus 3 or 4 foot free board.

Such an improvement would treat all alike and minimize what the District perceives to be insurmountable difficulties with a (S.P.F.) ring levee, and financial problems (funding locally and Federally) that would occur with a (S.P.F.) levee around the entire District.

Respectfully Submitted,

Lee Trentman
Chairman, Board of Commissioners

Commissioners

Ross Breckenkamp

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
2701 Rockcreek Parkway, Suite 106
North Kansas City, Missouri 64116

KANSAS CITY AREA OFFICE
816/374-6166

ECOLOGICAL SERVICES
816/374-5931

April 29, 1982

Mr. Doyle W. McCully
Rock Island District, Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Dear Mr. McCully:

This is in response to your letter of April 20, 1982, regarding the proposed flood damage reduction project in South Quincy Drainage and Levee District, Adams County, Illinois.

We have reviewed your information and believe that there will be no impact on the endangered species.

This completes the Section 7 consultation procedure. Should the project change significantly, or new species be listed, consultation should be reinitiated. We appreciate your cooperation in protecting endangered species.

Sincerely yours,

Tom A. Saunders
Area Manager

cc: R-3 (SE)
Mr. Mike Sweet (IL DOC)
RIFO

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
1101 Rockefeller Parkway Suite 158
North Aurora, Illinois 60542

ECOLOGICAL SERVICES
630/ 879-0851

July 15, 1982

Colonel Bernard P. Slofer
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building
Rock Island, IL 61201

Dear Colonel Slofer:

This is our final fish and wildlife report for the South Quincy Drainage and Levee District in Adams County, Illinois. It has been prepared under the authority of and in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The preparers include Judy Gustitus, Fish and Wildlife Biologist, and Thomas Groetsch, Field Supervisor, both of the Rock Island Field Office, Rock Island, Illinois. The comments on this report provided by the Illinois Department of Conservation are attached.

Our letter dated July 15, 1982 provided our draft fish and wildlife report, evaluating flood control alternatives and their potential impacts. Since that time, two aspects of the project have been brought to our attention which were not considered during the draft report phase: obtaining clay borrow from the Mill Creek side of the levee and seeding the sand levee with prairie grasses. This final report will primarily focus on these two points; other proposed borrow areas and the loss of slough and bottomland hardwood habitat in relation to the preferred plan. Information for this report is based on discussions resulting from the June 11, 1982 meeting between our staffs, our draft fish and wildlife report and a May 1982 Tie 3 survey of the Mill Creek area.

The preferred plan to be evaluated in this report includes enlarging the Mississippi River flank levee with sand borrow along the landward side. The Mill Creek flank upstream of station 4+00(B) (see map, attachment 1) and the Curtis Creek flank will be enlarged with clay or other impervious material.

Description of the Project Area

For the purposes of this report, the project area is defined as the area within the existing levee system. This includes approximately the area landward from Mill Creek to the south, along Goose Island side channel and Texas Chute to the west with Curtis Creek as the northern border (see map). The project area incorporates approximately 7 square miles. Of this, about 10 percent constitutes deciduous forest and 7.5 percent comprises surface waters.

The largest use category is cropland and pasture with about 61 percent of the area. Probably no more than 200 residents live in the project area. Industrial and commercial use is concentrated in the northeast corner.

Fish and Wildlife Resources of the Project Area and Adjacent Lands

Vegetation along the unprotected floodplains of the Mississippi River and Mill Creek consists primarily of older-stand mixed lowland hardwood. Sycamore, slippery elm, hackberry and red mulberry trees are common. Understory cover consists primarily of silver maple, box elder, red mulberry, poison ivy, riverbank grape and elderberry. Common ground cover species include nettle, pokeweed, false nettle, poison ivy, bedstraw and bur cucumber. The pileated woodpecker and birds that utilize the upper canopy are likely found along the unprotected floodplain. The understory and ground cover types provide large quantities of seeds for sparrows, ground-feeding songbirds, mourning doves and cover for white-tailed deer.

Forested sloughs of the protected floodplain are found primarily in the central and south-central regions of the project area. Trees present besides the typical bottomland species of cottonwood, silver maple and willow include green ash, sugarberry, black cherry, eastern redbud, shagbark hickory and several types of oak. These tree species provide the overstory that surrounds a narrow buttonbush scrub-shrub wetland zone. This, in turn, surrounds an emergent marsh/aquatic bed wetland. Aquatic vegetation occurring in the wetlands includes American lotus, spearing rush, wild water pepper, duckweed, American pondweed, arrowleaf and cattail.

Forested sloughs provide habitat relatively unique to the area. The overstory trees include mast and fruit bearers infrequently found in the floodplain of Pool 21. They are an important food source for resident and migratory songbird populations and squirrels. Wood ducks, pileated woodpeckers and prothonotary warblers use the cavities of the overstory trees for nesting. Five prothonotary warbler nesting boxes have been placed around Big Lake by a local Audubon Society member. When checked last spring, all boxes contained successfully nesting pairs of prothonotary warblers. The overstory trees also provide benefits to the wetland. Leaf litter provides a nutrient source. Fallen branches provide shelter and habitat diversity. In places where trees overhang the slough, shade protects the water from the sun's warmth and fallen insects provide food for fish and reptiles.

Typically, an intermediate scrub-shrub zone dominated by buttonbush lies between the overstory trees and the slough. Furbearers such as mink and beaver require cover when traveling to and from the water. The scrub-shrub zone provides this cover. It also provides food and cover for rabbits, nesting habitat for birds such as the green heron and browse for white-tailed deer.

Many of the sloughs are palustrine emergent wetlands dominated by American lotus, cattail or smartweed. The sloughs were formed as backwaters of the Mississippi River. Levee construction cut-off their union with the river. Subsequent siltation has reduced their depth. These factors have contributed to a decline in fishery quality. However, many people appear to fish the sloughs regularly. At least five people were observed fishing in different places during our 1981 mid-week field inspection. Cabins and boats also suggest

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recreational use of the sloughs. Fish species likely to be caught include sunfish, bullheads and rough fish.

The sloughs provide food and shelter for many species of animals. Mallards feed on acorns, coontail and seeds of smartweed and buttonbush. Ducks for the future, a local wildlife organization, stocked 250 ducklings in Sand Lake last spring. Wood ducks up to six weeks of age feed primarily on insects, after which vegetable matter is consumed including sago pondweed, algae, duckweed and, primarily, acorns. Local residents recall large populations of wood ducks with reduced breeding populations still present. Flycatchers feed on insects near the slough, kingfishers dive for small fish, great blue herons (observed in the area) stalk fish and frogs. Rails, ducks, shorebirds and marsh wrens nest in the emergent vegetation. Turtles, frogs, salamanders, furbearers and small mammals also feed and seek cover in the slough area.

Croplands provide food as waste grain and corn stubble for wood ducks and mallards, bob-white quail, white-tailed deer and small mammals. Croplands provide the greatest benefits when associated with natural cover like the forested sloughs.

The developed industrial area has poor wildlife habitat and in some places virtually no habitat exists. The contractor identified a small drainage ditch-type stream and seepage pond about 2 acres in size as the only surface water resources occurring in the northeast corner. The stream has limited aquatic resources. Its banks provide marginal cover for small mammals, some herptiles, and birds. The small seepage pond was not found. The field inspection by our staff showed only cropland where the pond was supposed to be. We did, however, observe a disturbed wetland near the sewage treatment plant.

We anticipate that the future without project construction for the South Quincy Drainage and Levee District will be similar to present conditions. Industrial or commercial enterprises may expand farther south and west but it appears unlikely they would come close to the forested sloughs of the south-central part of the district. However, expansion of the industrial area will likely not occur as rapidly without project construction as with it. The forested sloughs are apparently too wet to farm and will likely remain so. The drainage district may see more recreational use over the next fifty years.

Endangered Species

My letter dated April 29, 1982 to Mr. Doyle McCully of your staff stated our concurrence with the assessment that there will be no impact on the endangered species. A copy of the letter is enclosed (attachment 2).

The Selected Plan

The plan selected by the Rock Island District would provide protection from floods having a 3.2 percent chance of being equalled or exceeded in any year (500-year frequency). The selected plan involves raising about 4.2 miles of existing levee about 3.5 feet. The mainstem levees would be raised with hydraulic sand fill obtained from selected backwater sloughs of the Mississippi River. The fill would be placed on the crown and landward slope of the existing levee adding about 35 feet to the basal width. The levee slopes are proposed to be seeded with sand-tolerant species of prairie grasses except in the riprapped sections.

The flank levees along Curtis and Mill Creeks would be raised with clay fill and seeded except for areas of riprap or concrete floodwall. The basal width would be increased by about 25 feet. The fill is proposed to be placed on the crown and riverward slope of the existing levees. Borrow areas for the clay fill have been proposed along Mill Creek or on the bluff east of Highway 57.

Impacts of the Corp's Preferred Plan

1. Mississippi River Flank

Raising the existing levee with sand fill would result in both adverse and beneficial impacts to the fish and wildlife resources of the South Quincy area. Filling in about 4 acres of sloughs and removing 4 acres of bottomland hardwoods would reduce an already diminishing habitat (as evidenced by adjacent drainage and levee districts). This would occur along Brewer Slough, Sand Slough and near river mile 321.9. The levee base would be expanded about 35 feet along the landward side into the above mentioned slough areas. For greater portion of the levee district, however, landward levee expansion would not result in significant impacts.

Included as part of the project plans is a proposal to seed the sand levee with prairie grasses. As the existing sand levee is essentially devoid of vegetation, seeding the levee with prairie grass would improve the levee over existing conditions. A prairie grass levee would provide potential nesting habitat for pheasants, bob-white quail (which historically inhabited forest-prairie edge), mourning doves and songbirds like meadowlarks and sparrow species.

Sand borrow dredged from the river would remove those benthic organisms directly affected. Adjacent benthic communities may be buried due to increased turbidity. Turbidity from the silt layer and its accompanied potential release of contaminants could impact the fisheries of the area.

Dredging the river for sand borrow could also enhance the aquatic resource. Many of the backwaters and side channels of the area are filling in with sediment. Dredging and deepening these waters would increase the water volume and consequently the water quality. The slack water habitat provides feeding and spawning areas for fish and feeding and resting areas for water-related birds. Though the top part of the backwater substrate may be silt, it is likely that much usable sand lies underneath. The silt can be disposed to the nearby farm fields or preferably stored and graded over the sand for seeding purposes. Our Mark Twain Refuge staff at Quincy recommended two side channels which could be improved by dredging. These are the Beebe Island and the Fabius Island side channels. Beebe Island side channel reportedly contains mostly all sand and little silt. Texas Chute landward of Ward Island could also be improved through dredging. The GREAT II Side Channel Work Group Appendix recommendations should be consulted when borrow areas are being determined.

The most significant impact resulting from raising the levee may be increased land values and subsequent increased demand for land. With flood protection

increased to the 500-year flood level, both industry and agriculture may find expansion within the drainage district more appealing. Removing the forests around the sloughs would severely reduce the sloughs' benefits to fish and wildlife. Tree removal would increase solar heating on the wetland and erosion and sedimentation while decreasing nutrient input, habitat diversity, and species numbers and types. Thus, even though actual filling of the sloughs would require a 404 permit, much of their value would be lost if the surrounding trees were cleared.

Increasing the levee height may raise flood heights. The cumulative impact of many levees along the river may be the virtual channelization of the river. This is due to increased scouring from increased velocity and flood flows.

II. Mill Creek Flank

Impacts resulting from raising the Mill Creek flank levee may be both adverse and beneficial. Expanding the levee to the creek side would result in a permanent loss of about 2 acres of riparian habitat. Removal of the clay borrow from the Mill Creek corridor would adversely impact an additional estimated 18 acres. Mature and mixed bottomland timber (see photos 1 and 2) would be permanently lost in the case of the levee expansion and would be replaced with borrow pits in the case of using the area for fill. The woody riparian habitat provides a travel corridor between open agricultural areas and protects the sinuosity of the creek by serving as an erosion control measure. Replacing the riparian habitat with borrow pits may result in increased erosion, turbidity and sedimentation in Mill Creek, reduce the protection afforded the levee from wave wash, may encourage agricultural practices creek-side of the levee and would replace existing habitat with that which may take years to provide fish and wildlife benefits.

The sloughs adjacent to the levee toe (see photos 14 and 15) provide habitat for resident and migratory waterfowl, local furbearers and herptiles. Removing the slough habitat may stress local wildlife and in a cumulative sense, may contribute to a significant loss of wetland habitat.

Additional adverse impacts which may result from raising the Mill Creek flank include raising flood heights and increased creek scouring.

Removing borrow to raise the Mill Creek flank may be performed in a manner beneficial to fish and wildlife. As was discussed between our staffs at the June 11, 1982 meeting, 4.5-6.0 acres of environmentally enhanced borrow areas in agricultural land adjacent to the Mill Creek corridor should offset the fill in the sloughs (see photo 17). Planting trees and shrubs on about 4 acres of land surrounding the borrow area would off-set bottomland hardwood loss. Other borrow sites which would benefit fish and wildlife include borrowing from sloughs along Mill Creek (see photos 7 and 8) and in sloughs within the district (see photo 9). These sloughs have filled with sediment and soon may completely fill in, losing most of their benefits for fish and wildlife. Excavation of borrow from the Mill Creek sloughs would increase their value for fisheries if a downstream cut was made between the slough and the creek to allow for fish movement. Excavation of borrow from forested sloughs within the district would benefit duck use by allowing growth

of a greater variety of vegetation, by increasing the duration of open water and by increasing the life of the slough. The top silt layer to be removed could be spread over agricultural fields or over the levee for seeding purposes. Excavation of 4.5-6.0 acres of sloughs for borrow should also offset impacts from filling the sloughs due to levee expansion.

Levee expansion along Mill Creek is proposed for the creek side. In several places, this is necessary to avoid displacement of residences and to insure that the access road is floodproofed. One stretch, however, about 2500 feet long should be suitable for landward expansion to minimize destruction of Mill Creek riparian habitat (see map). Expanding the levee landward along this 2500-foot stretch would reduce the loss of bottomland hardwood and slough habitat from 2 acres to about 0.5 acres. The 0.5 acre loss would occur primarily in slough habitat between station 400+00 and 405+00 (see map). Measures used to offset the loss of 4 acres of sloughs within the district may be increased to include habitat losses resulting from expansion of the Mill Creek flank.

III. Curtis Creek Flank

Impacts to fish and wildlife resources resulting from increasing flood protection along Curtis Creek should not be significant. The portion of Curtis Creek along which flood control improvements would occur has been channelized. The bank along the district is riprapped or walled for most of this stretch. The opposite bank has overhanging vegetation which should not be altered due to project construction (see photo 16).

Instream work during floodwall construction would occur between the railroad and Highway 57. However, if best construction techniques are used to minimize disturbance, impacts should be minor.

The levee tie-off on the bluff side of Highway 57 and adjacent to Indian Mounds Park will require placement of riprap along the creek side of the levee. This upper end of the levee is located along the transition zone between the upper rithron and lower potamon habitat of Curtis Creek. The tie-off would not extend into the riparian habitat of the upper rithron reaches. Impacts from placing riprap along the shore of the potamon area and adjacent to a factory should not be significant. Levee construction could, however, be aesthetically unpleasing to adjacent park users.

Recommendations for Fish and Wildlife Trade-Offs

1. Loss of wetland habitat through filling for levee expansion should be offset by borrowing for clay fill in a manner beneficial to fish and wildlife.

   Wetland loss to be offset within the district approximates 4 acres. Additional Mill Creek wetland loss ranges from about 0.5 acres for creekward and landward expansion to 2.0 acres for primarily creekward expansion. Methods to offset the 4.5-6.0 acre wetland loss should include borrowing from farmland adjacent to the Mill Creek corridor, dredging from sloughs adjacent to Mill Creek or dredging from sloughs within the district. Selection, design and revegetation of borrow sites should be done in coordination with the Illinois Department of

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Conservation (IDOC) and our Rock Island Field Office. If the farmland borrow site is used, it should be permanently protected from cutting, burning, draining or filling. If a Mill Creek slough is used, a downstream cut should be made to connect the slough with the stream for fisheries use. If sloughs within the district are used for borrow, dredging and deepening should enhance the area for waterfowl.

2. Loss of 3-5 acres of bottomland hardwood habitat will require replacement for the number of acres lost by planting trees and shrubs beneficial to wildlife (like mast or fruit producers).

3. Except for filled slough areas, Mill Creek riparian habitat should not be used for borrow.

4. Sand borrow from the river should be taken from Beebe Island side channel, Texas Chute, or other locations recommended by the GREAT II Side Channel Work Group Appendix to enhance aquatic resources.

   Final borrow site selection should be coordinated with IDOC and our Rock Island Field Office.

5. The Mill Creek flank should be raised along the landward side to the extent feasible.

   In particular, the 2500' bluffward of approximate station 405+00 should be enlarged along the landward side.

6. Sand levee expansions should be done in a manner to minimize fill spillage into the sloughs.

   Berms should be constructed to direct run-off away from the sloughs.

7. Work performed in Curtis Creek should be done in a manner to minimize disturbance.

   The vegetation along the north bank of Curtis Creek should not be removed. Riprap placed on the Curtis Creek levee near Indian Mounds Park should be planted with vines to minimize aesthetic impacts to the park.

8. We encourage the seeding of the sand levee with prairie grasses.

The above recommendations have been formulated in coordination with your staff. We look forward to further coordination on borrow site selection and revegetation plans.

Sincerely,

Tom A. Saunders

Area Manager

Enclosures

cc: IDOC (Lutz, Bertrand)
IEPA
USEPA (Chicago)
USFWS (RO, MO, RIFO, MOTWN NWR)

100

United States Department of the Interior

FISH AND WILDLIFE SERVICE
2701 Rockcreek Parkway, Suite 104
North Kansas City, Missouri 64116

KANSAS CITY AREA OFFICE
816/374-6166

ECOLOGICAL SERVICES
816/374-3921

April 29, 1982

Mr. Doyle W. McCully
Rock Island District, Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Dear Mr. McCully:

This is in response to your letter of April 20, 1982, regarding the proposed flood damage reduction project in South Quincy Drainage and Levee District, Adams County, Illinois.

We have reviewed your information and believe that there will be no impact on the endangered species.

This completes the Section 7 consultation procedure. Should the project change significantly, or species be listed, consultation should be reinitiated. We appreciate your cooperation in protecting endangered species.

Sincerely yours,

Tom A. Saunders
Area Manager

cc: R-3 (SE)
Mr. Mike Sweet (IL DOC)
EMRO

attachment 2

South Quincy Drainage & Levee District - Letters key photographs to map

attachment 1

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Illinois Department of Conservation
life and land together

LINCOLN TOWER PLAZA • 524 SOUTH SECOND STREET • SPRINGFIELD 62706
CHICAGO OFFICE - ROOM 100 160 NO. LASALLE 60601
David Kenney, Director • James C. Herlich, Assistant Director

July 1, 1982

Mr. Thomas M. Groutage
Field Supervisor
U. S. D. I., FWS
Rock Island Field Office (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

Dear Mr. Groutage:

The Department has reviewed your final Fish and Wildlife Coordination Report for the South Quincy Drainage and Levee District. The report adequately discusses projected impacts to the area's fish and wildlife resources and we concur with your recommendations for Fish and Wildlife Trade-Offs.

Sincerely,

Richard W. Lutz, Supervisor
Impact Analysis Section
Division of Planning and Information

RWL:alc

attachment 3

JUL 3 1982

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1. Mill Creek flank at (a) looking west.

2. Mill Creek flank at (b) looking west along area recommended by FWS for landward levee expansion.

3. Mill Creek riparian habitat.

4. Mill Creek riparian habitat.

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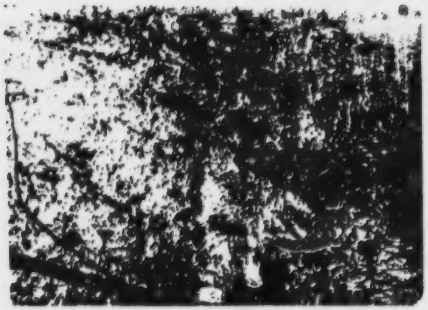
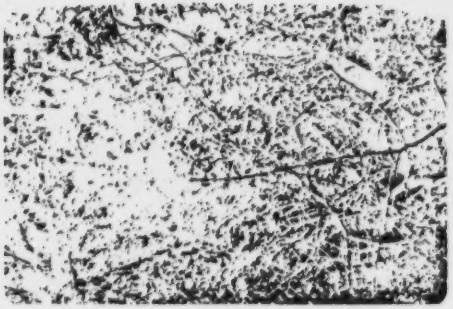


5. Mill Creek riparian habitat.



6. Mill Creek riparian habitat.

7. Old slough adjacent to Mill Creek.

8. Old slough adjacent to Mill Creek.

9. Brewer Slough at (c) adjacent to the sand levee.

10. See #9.

11. See #9.

12. The workings of a piliated woodpecker along levee toe at (c).

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13. Sand levee and clay levee interface at (d) near station 400+00.

14. Slough along Mill Creek levee toe at (e).

15. Slough along Mill Creek flank levee toe looking east at (e).

16. Curtis Creek at (f) looking west toward creek's mouth.

17. Potential clay borrow site for Mill Creek flank at (g). The size of the borrow site is approximately 5 acres.

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DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:
NCRED-P

FINAL ENVIRONMENTAL IMPACT STATEMENT

MISSISSIPPI RIVER
COON RAPIDS DAM TO OHIO RIVER
FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION
SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
ILLINOIS

INTERIM REPORT NO. 3

JUNE 1982

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FINAL ENVIRONMENTAL IMPACT STATEMENT

PROPOSED PLAN FOR FLOOD DAMAGE REDUCTION FOR THE SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT, ADAMS COUNTY, ILLINOIS

THE PLANNING AGENCY IS THE US ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT, ROCK ISLAND, ILLINOIS

ABSTRACT:

Raising existing levees for protection from the 500-year frequency flood event is being recommended.

The levee being considered for modification is an agricultural-industrial levee and affords protection from the 50-year-frequency flood event on the Mississippi River. The levee is about 8.8 miles long and starts in the vicinity of Curtis Creek and Highway 57 on the north, runs along the south bank of Curtis Creek, along the east bank of the Mississippi River, and along the north bank of Mill Creek, and ends in the area of Mill Creek and Highway 57.

The levee modification will require approximately 150,000 cubic yards of impervious borrow and 1,100,000 cubic yards of pervious borrow. The sources of pervious borrow are sand dredged from nearby backwater areas of the Mississippi River and sloughs along the Mill Creek Flank Levee. Impervious borrow would be obtained from areas along Mill Creek.

The existing levee encloses about 5,800 acres of bottom land. About 3,800 acres of this is cropland; 165 is commercial-industrial-residential; and 1,835 acres is devoted to surface waters, forested areas, and other uses. For further information please contact:

District Engineer
US Army Engineer District, Rock Island
ATTN: Planning Branch, Environmental
Analysis Section
Clock Tower Building
Rock Island, Illinois 61201
309/788-6361, Ext. 6344

Send Comments Within 30 Days of Notice in the Federal Register to:

District Engineer
US Army Engineer District, Rock Island
Clock Tower Building
Rock Island, Illinois 61201

NOTE: Information, Displays, Maps, etc., Discussed in the "Mississippi River-Coon Rapids Dam to Ohio River" Interim Report 3 Are Incorporated by Reference in the Draft EIS.

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SUMMARY

MAJOR CONCLUSIONS AND FINDINGS

Raising the existing levee with expansion of the levee base to the landward side is designated the EQ Plan. The plan includes mitigation for impacts to approximately 4.5 acres of wetlands/slough habitat. Net environmental benefits can be achieved through the deepening of nearby backwater areas from dredging. This plan has also been designated the NED Plan because it maximizes net benefits.

Processing under Section 404(r) of the Clean Water Act will be necessary for discharges of concrete into Curtis Creek for the construction of flood walls, for impacts to approximately 4 acres of wetland/slough areas from landward expansion of the mainstem levee base, for impacts to 0.5 acres of weland/slough areas from creekside expansion of the Mill Creek Flank Levee, and for hydraulic borrow dredging in the Mississippi River backwaters. The preliminary Section 404 Evaluation is attached to the FEIS. Circulation of the FEIS will constitute public review of the preliminary Section 404 Evaluation.

The proposed project is considered to be in accordance with Executive Order 11988 on Flood Plain Development. Approximately 4.5 acres of wetland/slough habitat would be impacted. The proposed project is in compliance with E.O. 11990 on protection of wetlands because there is no practical alternative to these impacts. Mitigation for impacts to 4.5 acres of wetland/slough habitat has been identified.

AREA OF CONTROVERSY:

No major areas of controversy have emerged thus far in the study.

UNRESOLVED ISSUES:

A disagreement exists between the US Fish and Wildlife Service and the Rock Island District about two aspects of the project.

(1) In Recommendation No. 2 of the Final Fish and Wildlife Coordination Act Report the replacement of 3-5 acres of bottomland hardwood habitat is recommended. The District feels this type of habitat is abundant in the project area and mitigation for this loss is not justified.

(2) In Recommendation No. 3 of the Final Fish and Wildlife Coordination Act Report it is recommended that the use of areas along Mill Creek for borrow should be avoided. The Rock Island District feels that environmental impacts will not be significant and obtaining borrow from these areas is an efficient use of Federal funds. In addition, approximately 5 acres of the 18 acres designated for borrow use is currently used for agriculture and will be shaped, graded, and seeded to encourage natural wetland development as part of the project mitigation plan for wetland impacts.

RELATIONSHIP TO ENVIRONMENTAL PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS:

See table EIS-1.

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TABLE EIS-1

Relationship to Environmental Protection Statutes and Other Environmental Requirements

STATUTE OR REQUIREMENT	RELATIONSHIP					
	EVACUATION	FLOODPROOFING	FLOOD WARNING & FORECASTING	RAISE LEVEE LANDWARD EXPANSION	RAISE LEVEE RIVERWARD EXPANSION	RING LEVEES
FEDERAL STATUTES						
Archaeological and Historic Preservation Act (as amended)	N/A	Non	N/A	Full	Non	Non
Clean Air Act (as amended)	N/A	N/A	N/A	Full	Full	Full
Clean Water Act (as amended)	N/A	N/A	N/A	Full	Partial	Partial
Coastal Zone Management Act (as amended)	N/A	N/A	N/A	N/A	N/A	N/A
Endangered Species Act (as amended)	N/A	N/A	N/A	Full	Partial	Partial
Estuary Protection Act	N/A	N/A	N/A	N/A	N/A	N/A
Federal Water Project Recreation Act (as amended)	Full	N/A	N/A	Full	Full	Full
Fish and Wildlife Coordination Act (as amended)	Full	N/A	N/A	Full	Full	Full
Land and Water Conservation Fund Act (as amended)	N/A	N/A	N/A	Full	Full	Full
Marine Protection, Research and Sanctuaries Act	N/A	N/A	N/A	N/A	N/A	N/A
National Historic Preservation Act (as amended)	N/A	Non	N/A	Full	Non	Non
National Environmental Policy Act (as amended)	Full	Full	Full	Full	Full	Full
Rivers and Harbors Act	N/A	N/A	N/A	N/A	N/A	N/A
Watershed Protection and Flood Prevention Act	N/A	N/A	N/A	N/A	N/A	N/A
Wild and Scenic Rivers Act (as amended)	N/A	N/A	N/A	N/A	N/A	N/A
EXECUTIVE ORDERS AND MEMORANDA						
Flood Plain Management (E.O. 11988)	Full	Full	Full	Full	Full	Full
Protection of Wetlands (E.O. 11990)	N/A	N/A	N/A	Full	Full	Full
Analysis of Prime & Unique Farmlands	N/A	N/A	N/A	Full	Full	Full
STATE AND LOCAL POLICIES						
State Endangered Species	N/A	N/A	N/A	Full	Partial	Partial
LAND-USE PLANS	N/A	N/A	N/A	N/A	N/A	N/A
REQUIRED FEDERAL ENTITLEMENTS						
Section 404 Permit (Clean Water Act)	N/A	N/A	N/A	Full	Partial	Partial

COMPLIANCE CATEGORIES:

a. Full Compliance. Having met all requirements of the statute, E.O. or other environmental requirement for the current stage of planning (either pre or postauthorization

b. Partial Compliance. Not having met some of the requirements that normally are met in the current stage of planning.

c. Non-Compliance. Violation of a requirement of the statute, E.O. or other environmental requirement.

d. Not Applicable. No requirements for the statute, E.O., or other environmental requirement for the current stage of planning.

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MISSISSIPPI RIVER
COON RAPIDS DAM TO OHIO RIVER
FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION
SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
ILLINOIS
INTERIM REPORT NO. 3

FINAL ENVIRONMENTAL IMPACT STATEMENT

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ATTACHMENT

Section 404 Preliminary Evaluation Report

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SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
ILLINOIS
INTERIM REPORT NO. 3
FINAL ENVIRONMENTAL IMPACT STATEMENT

SECTION 1 - NEED FOR AND OBJECTIVES OF ACTION

STUDY AUTHORITY

(1) Local interests in the South Quincy Drainage and Levee District, Adams County, Illinois, requested, through their Congressional representatives, a study to determine whether existing levees should be improved to provide a higher degree of flood protection. On 11 December 1969, the Committee on Public Works of the House of Representatives adopted a resolution authorizing the study.

INTENT OF CONGRESS

(2) This study is part of an overall investigation of the Mississippi River flood plain. In 1969, Congress authorized feasibility studies for flood damage reduction along the Mississippi River from Coon Rapids Dam to the mouth of the Ohio River.

PUBLIC CONCERNS

(3) About 9.2 miles of earth levee plus flood walls constructed by local interests and improved by the Federal Government provides some degree of protection for the South Quincy Drainage and Levee District. This existing system was designed and built to provide protection against a flood having a 2 percent chance of being equalled or exceeded in any year, i.e., a 50-year flood. It was based on data developed in the 1940's and approved in 1954. Development of recent flood data, high costs of massive emergency operations, seepage damage, and preventive evacuation have all emphasized the need for additional protection.

(4) Most of the flooding in the district results from a combination of snowmelt and heavy rainfall over the Upper Mississippi River Basin. Flooding has frequently threatened the agricultural land within the South Quincy Drainage and Levee District.

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(5) To date the existing Federal levee has not been overtopped. The 1973 flood is the only current example reflecting potential damages in which damages were the result of seepage. Damages in the district from the 1973 flood were $1,200,000. If overtopping or levee failure had occurred, it is estimated that damages would have exceeded $34 million. If overtopping or levee failure would occur today, estimated damages could exceed 150 million dollars. Since most of the drainage district is in agricultural production and is not intensely inhabitated, and because most residents would have evacuation time, health, safety, and well-being considerations are not as great. A risk does exist, however, for those involved in emergency evacuation and protective measures. Also, levee failure could displace residents from their homes for up to 2 months.

(6) The primary problem and needs in the drainage district stem from the threat of flooding and the need for additional flood protection.

(7) Initial public meetings were held in June 1971. Informal meetings with officials and other interests have also been held. Officials of the drainage district indicated at the meetings that they feel additional protection is needed.

PLANNING OBJECTIVES

(8) To develop a flood damage reduction program for the high quality agricultural lands and existing industrial and commercial facilities between Mississippi River miles 318.0 to 325.2.

SECTION 2 - ALTERNATIVES

PLANS ELIMINATED FROM FURTHER STUDY

NONSTRUCTURAL PLANS

Floodproofing

(9) Floodproofing is not considered practical. With a 100-year flood, depths over most of the area would reach a maximum of about 15 feet, which would shut off any emergency access to or evacuation of the structures and would halt business operation in the commercial sector for at least 2 months. In addition, the area is predominantly agricultural land and not capable of being floodproofed.

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(10) If this plan were implementable, there would be no impacts to natural resources or endangered species and no mitigation would be required. There would be a low probability of impacts to cultural resources. Since this is not a viable alternative, it is precluded from consideration as the EQ Plan.

(11) This plan would have several temporary negative, social, and economic effects. During a flood event, residents would have to be evacuated and housed elsewhere. Business and industry would experience temporary shutdowns. Farming would experience significant crop damage. All of these flood consequences would be reflected negatively in the lives and personal income of area residents, in business and industrial income, and in the tax base.

(12) Periodic flood events may present a potential health hazard through waterborne pollutants and pathogenic agents, flooding of septic fields, and increased populations of disease-carrying insects in standing water areas.

Flood Plain Zoning

(13) Zoning and building code regulations would stop possible future development in the area. If adequate structural protection is not provided, it is assumed that regulatory controls would be adopted. The Flood Disaster Relief Act of 1973 required that regulatory controls be implemented in areas subject to inundation by the 100-year flood if those areas are to be eligible for federally subsidized flood insurance. However, zoning would not protect existing development which consists of 8 to 10 businesses and industries in the northeast corner of the levee district, farmsteads and residences that house less than 200 people, summer cottages, and about 3,800 acres of cropland.

STRUCTURAL PLANS

Upstream Reservoir

(14) Control of flows on the Mississippi River by a mainstem reservoir is impractical because of upstream improvements in the flood plain. Control of major tributaries to the Mississippi is not possible because of economic, environmental, political, and terrain conditions.

NO FEDERAL ACTION

(15) The "No Federal Action" plan would do nothing to alleviate the flood problems of the South Quincy Drainage and Levee District.

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(16) Some nonstructural measures are now or could be expected to be a part of the condition of the area. Flood warning, emergency flood control measures, temporary evacuation, and flood disaster relief programs are or could be used to reduce the hazard and impact of floods.

(17) It is a plausible assumption that both regulatory controls of flood plain use and development and a flood insurance program will be implemented in the drainage district if no additional Federal program is provided. With no additional Federal program, the flood damage potential in the area will not change. Average annual damages in the area are more than $3 million. These damages, along with the costs of administering the flood insurance program and floodproofing new development, represent the cost to the Nation of the "No Federal Action" alternative.

(18) Under the "No Action" plan, no significant change in natural areas and associated ecological systems is expected other than natural successional change and eutrophication. This would tend to support national policies and goals of conserving and enhancing natural resources.

(19) With no additional Federal program, agricultural land-use productivity would probably continue at current levels. However, with levee overtopping or failure and inundation, the crop productivity would be lost for the year. Erosion, siltation, and damage to farmsteads may impact on productivity and efficiency for several years.

(20) Commercial and industrial development is anticipated to continue without any additional flood protection. Flood insurance would reduce the impact of flood losses. However, based on the experience in similar areas in the 1973 flood, the interruption in business operations for periods of two months or more would probably result in the business failure of some enterprises.

(21) Because the Mississippi River is relatively slow in rising, and a flood forecasting system is used, there is not a great hazard to the people of the district. However, there is a potential hazard to health by waterborne pollutants and pathogenic agents, flooding of septic fields, and increased populations of disease-carrying insects in standing water areas. Another factor which would impact on social well-being with major floods is the emotional stress associated with natural disasters.

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PLANS CONSIDERED IN DETAIL

NONSTRUCTURAL PLANS

Flood Plain Evacuation

(22) Flood plain evacuation may be temporary or permanent. Temporary evacuation serves to protect the people of an area and their personal property. Permanent evacuation involves removing buildings and prohibiting new construction on flood-prone lands. Some of the smaller industries in the study area could be relocated. Relocation of larger industries is not economically feasible because of the high property values involved and the dependence of one industry, the Calcium Carbonate Company, on locally quarried limestone. Also, some businesses and industries may prefer using their existing facilities rather than building new ones at today's high construction costs.

(23) Most of the area presently receives some flood protection from the existing levee system and, in addition, the rich farmland will be in greater demand in the future. Mass evacuation would severely disrupt the social stability and cohesion of the residents. Temporary evacuation of the flood plain would satisfy only a minor portion of the project goal of flood damage reduction; and, therefore, is not an acceptable solution.

(24) Permanent evacuation of the flood plain would be economically infeasible and would be limited by the reluctance of some businesses and industries to relocate. Therefore, flood plain evacuation is not considered an implementable alternative.

(25) If the plan were implementable, the environmental impacts at the relocation sites would have to be cumulatively evaluated in order to get a complete assessment of the impacts. Excluding impacts at the relocation sites, this plan would have no impact on natural resources, endangered species, or cultural resources and no mitigation would be required. The unknown impacts at the relocation sites, plus the fact that this is not considered an implementable plan precludes further consideration of this alternative as the Environmental Quality (EQ) Plan. The EQ Plan makes the greatest net contribution to the EQ Account.

(26) This plan would have several negative social and economic effects because the relocation of industry would mean the loss of jobs in the area and the loss of income for those members of the work force unable or unwilling to relocate. The loss of industrial and personal income is consequently reflected negatively in the tax base. Farming would continue in the area and periodic flood events would produce significant crop damage. The abandonment of structures would produce negative aesthetic effects and a hazard potential. Removal of abandoned structures would require expensive wrecking and debris disposal efforts.

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Flood Warning and Forecasting

(27) Flood warning systems consist of water level sensing devices which are connected to an alarm that is activated by rising water levels. These systems provide some measure of added protection on the smaller, faster rising streams, but have little, if any, value on large, slow rising streams such as the Mississippi River where the normal slow rising nature of the stream provides adequate warning time.

(28) Because the Mississippi River is relatively slow rising, and a flood forecasting system is used, there is not a great hazard to the people of the district. However, there is a potential hazard to health by waterborne pollutants and pathogenic agents, flooding of septic fields, and increased populations of disease-carrying insects in standing water areas.

(29) Since this alternative does not meet the project goal of flood damage reduction, it is not considered an implementable alternative and is not a candidate for designation as the EO Plan.

(30) Impacts to natural resources, endangered species, and mitigation requirements for this alternative would be the same as for the "Floodproofing" alternative. There would be no impact to cultural resources. Social and economic effects would also be similar to the "Floodproofing" alternative except that this alternative would result in greater flood damages to structures since it is assumed that floodproofing measures would not have been initiated.

STRUCTURAL PLANS

Ring Levees

(31) The industrial and commercial elements of the South Quincy Drainage and Levee District are concentrated in the northeast corner of the district in the vicinity of Curtis Creek and Highway 57. This area consists of about 8 to 10 businesses and industries which occupy about 165 acres and employ about 2,000 people. Ring levees at the 100-, 200-, 500-year, and Standard Project Flood (SPF) levels were considered for this area and would enclose about 560 acres including about 395 acres of agricultural land. The Standard Project Flood represents the maximum flood that would result from the most critical combination of factors producing the flood.

(32) The ring levees would be approximately 270 feet wide including a 100-foot berm, about 2.4 miles long, and would occupy 65 to 100 acres of land. This would also require raising an existing 0.2-mile section of levee and concrete floodwall along Curtis Creek and building a new 0.4-mile section of concrete floodwall further upstream. Only a small section along Curtis Creek where flood protection already exists will require the discharge of fill into the creek. This would be the footing for a concrete floodwall.

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(33) Borrow for the main part of the ring levee within the district and for the modification to the existing levee along Curtis Creek would be dry land fill which could be obtained from areas within the district or in the adjoining river bluffs.

(34) Terrestrial impacts of the ring levees primarily will be from agricultural land displaced by the levee alignment and excavation for ponding. This will amount to about 225 acres, classified as prime farmland. Several drainage ditches and a disturbed wetland (a seepage pond of less than 2-surface acres) are aquatic resources that would be impacted. The drainage ditches and disturbed wetland have marginal value as natural resources. The levee alignment will also require the removal of two residences and several farm buildings.

(35) At the section of Curtis Creek where the footing of a concrete floodwall would be set in the water, the creek is changing from a shallow, bedrock substrate to a deeper, slower flowing, soft-bottom channel with a low diversity of aquatic organisms and water quality that tends to be poor. Further upstream where the new concrete floodwalls would be built, the stream quality improves considerably, but the concrete floodwall would be set back far enough so that the stream would not be affected.

(36) The only federally listed endangered species reported for the project area is the American bald eagle (Haliaeetus leucocephalus). Eagle use of the area is along the Mississippi River, especially the shorelines south of Lock and Dam 21. Construction activities associated with this alternative will be far enough inland to avoid impacts to the bald eagle.

(37) Four endangered species listed by the State of Illinois are reported to be found in Adams County:

Gray Bat (Myotis grisescens)

Sedge (Carex prasina)

Buffalo Clover (Trifolium reflexum)

Arrowwood (Viburnum molle)

(38) (Seven more endangered plant species are listed as formerly having occurred in Adams County.) From descriptions of habitat requirements, it is anticipated that the "Ring Levee" alternative would not impact any of these four species.

(39) A cultural resources survey was conducted during the winter of 1975-76 which concentrated on areas immediately adjacent to the existing levee. This survey, although not directly applicable to the ring levee alignment, suggests that the probability of ring levee construction impacting cultural resources is low.

(40) The US Fish and Wildlife Service has suggested in-kind replacement for the 2-acre disturbed wetland which would be filled in by the ring levee alignment as mitigation. It was also suggested that borrow-sites, if located

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within the drainage district, could be enhanced for fish and wildlife purposes and mowing of levees could be postponed until after August 1st of each year to avoid impacts to ground nesting birds. Mitigation for the disturbance of cultural resources would probably not be necessary but additional cultural surveys would be required for a more definitive determination. Ponding requirements necessitated a change from the initially proposed levee alignment described in the DEIS. These changes have been incorporated into the FEIS and have been conveyed to the US Fish and Wildlife Service and the Illinois Department of Conservation.

(41) The "Ring Levee" alternative is not the selected plan for the following reasons:

(1) The ring levee would split the drainage district. Local sponsors have found this objectionable.

(2) The amount of agricultural land taken out of production would be large in proportion to the amount of land being protected.

(3) The "Ring Levee" alternative has not been designated as either the National Economic Development (NED) Plan or the Environmental Quality (EQ) Plan.

Raise Existing Levee

(42) The drainage district is currently protected by a sand, mainstem levee with a clay flank levee along Mill Creek at the south end of the district which provides protection from the 50-year flood event. There are two methods of raising the mainstem levee:

(1) Raise the levee by depositing sand borrow on the landward side of the levee. Sand borrow would be obtained from Mississippi River or its backwaters areas.

(2) Raise the levee by depositing clay borrow on the river side of the levee. Clay borrow would be obtained from bluff borrow sites or from within the drainage district.

(43) Protection from the 500-year frequency flood event is deemed sufficient to provide flood damage reduction designated as the primary objective of the project.

(44) Raising the existing levee is the recommended alternative for reducing flood damages for the South Quincy Drainage and Levee District. For the mainstem levee along the Mississippi River, obtaining sand borrow from backwater areas of the river and depositing the borrow on the landward side of the levee appears to be the most cost effective and least environmentally objectionable method of raising this portion of the levee. For an approximate 6,200-foot stretch of levee along Mill Creek at the south end of the district, clay borrow would be the most cost-effective method of raising the levee.

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Raising a levee automatically widens the levee base. If clay borrow is added to the river side of the levee, a steeper riverside slope can be maintained than can be maintained on the landward side by adding sand borrow. Adding clay borrow to the river side of the mainstem levee would thus take less acreage than adding sand to the landward side. The existing levee system is about 8.8 miles long and protects about 5,800 acres. Expanding the mainstem levee base riverward with clay borrow would require about 40 additional acres. The land taken up by the levee would contain bottom land hardwoods. About 50 percent of these lands are characterized as forested sloughs. These forested bottom lands and sloughs are considered valuable fish and wildlife areas. Expanding the mainstem levee base landward with sand borrow would require about 55 additional acres about 5 acres of which will be creek side expansion along the Mill Creek flank levee. The greatest portion of this expansion would be into pasture and cropland. At one point in the central part of the drainage district and at another in the southwest part of the district, landward expansion of the levee will encroach upon forested and wetland areas. This encroachment would amount to about 8 acres considered valuable for fish and wildlife. Therefore, expansion of the mainstem levee to the landward side with sand borrow is considered less disruptive than riverward expansion to the natural resources of the area. Furthermore, riverward expansion may have additional adverse impacts because there would be a need for more borrow sites than those shown on plate 2, whereas obtaining sand borrow from Mississippi River backwater areas for landward expansion could enhance these aquatic resources by deepening the water, increasing the volume, and subsequently improving the water quality. Construction and impacts along Curtis Creek at the north end of the drainage district would be similar to those described in the previous alternative "Ring Levees Around Concentrated Industrial and Commercial Development."

(46) Along the 6,200-foot section of Mill Creek where clay borrow is being considered for raising the levee, about 6 acres of land would be taken up by expansion of the levee base. For the lower 5,000 feet of this stretch, about 2,500 feet of the expanded levee base will be to the landward side. For the other 2,500 feet, expansion of the levee base will be towards the creekside in order to avoid encroaching upon a farmstead and to keep a residential access road on the landward side of the levee. For the upper 1,200 feet, expansion will straddle the levee and then veer to the landward side where the levee ties into high ground near Highway 57. Expansion to the creekside impacts bottom land wooded areas and a small wetland/slough area. Expansion to the landward side impacts areas used for agriculture. The agricultural land which would be impacted is classified as prime farmland. Clay borrow could most economically be obtained on the adjacent creekside of the levee. This would have similar impacts as the creekside expansion of the levee base except that with the passage of time the borrow areas would reestablish as wildlife areas whereas land occupied by the levee would not. Clay borrow obtained from areas within the drainge district or from nearby bluff areas would have higher costs.

(47) The only federally listed endangered species reported for the project area is the bald eagle (Haliaeetus leucocephalus). Lock and Dam Number 21 is

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in the northern part of the project area and bald eagles frequent the riverbank areas above and below the lock and dam during the winter months. These riverbank areas, especially those below the lock and dam, would be considered critical use areas for the bald eagle. The existing levee alignment comes within about 700 feet of these riverbank areas on the northern end and rapidly falls away to about 2,000 feet or more at the southern end of the eagle use area. At the north end of the mainstem levee near the mouth of Curtis Creek, the levee comes within about 250 feet of riverbank trees reported to be used by eagles as perches. This area is across the mouth of Curtis Creek from the levee and is not as critical a use area as the areas below the lock and dam appear to be. Human activity is normal since a paved road runs along the top of the levee.

(48) At the south end of the mainstem levee near the mouth of Mill Creek the levee comes within about 250 to 500 feet of another reported eagle-use area. The expanse between the levee and the shoreline is heavily wooded and provides a good screen between the eagle-use area and the levee. Hydraulic dredging activities would be at least 1,000 feet from reported eagle-use areas except at one proposed dredging site at the south end of the mainstem levee. Dredging activities at this site would come close to a reported eagle-use area. Dredging activities, though, would be restricted to seasons of the year when eagles would not be present. Thus no significant impacts to the species are anticipated. This determination is supported by a letter dated 29 April 1982 from the US Fish and Wildlife Service, Office of Endangered Species which can be found in Appendix C - Pertinent Correspondence.

(49) The Higgins' Eye pearly mussel (Lampsilis higginsi) is a federally listed endangered species. The Higgins' Eye is a large river, deep water form and could occur in the project area. However, an environmental resources inventory of the project area performed by a private contractor reported that no freshwater mussels listed as rare or endangered have been reported from the project area or collected as part of the environmental resources inventory study.

(50) Four endangered species listed by the State of Illinois are reported to be found in Adams County. These species were listed previously under the description of the "Ring Levee" alternative. From descriptions of habitat requirements, the only species listed which could be affected by the project is the sedge (Carex prasina). The closest location for which this species has been reported in Adams County is approximately 6 miles north of the project area. The "Raise Existing Levees" alternative is thus not anticipated to impact upon any State of Illinois listed endangered species. Coordination with the State on endangered species has been made but no comment has been received.

(51) A cultural resources survey conducted during the winter of 1975-76 determined that the landward expansion of the levee should have no significant impact on cultural resources of the area. This determination is discussed in more detail in Section 3 (AFFECTED ENVIRONMENT, CULTURAL RESOURCES; page EIS-25). Correspondence from the State Historic Preservation Officer

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and the Department of the Interior, Interagency Archaeologic Services supporting this determination can be found in appendix C. Mitigation for the disturbance of cultural resources would not be necessary.

(52) The US Fish and Wildlife Service, in their Final Coordination Act Report (Recommendation No. 1), suggested mitigation for approximately 4.5 acres of wetland/slough habitat which would be impacted by the project. Methods to accomplish this have been identified. The replacement of 3-5 acres of bottom land hardwood habitat was also recommended (Recommendation No. 2). The Rock Island District feels that this type of habitat is plentiful in the project area and mitigation for this loss is not required. The Final Fish and Wildlife Coordination Act Report can be found in Appendix C - Pertinent Correspondence.

(53) Additional recommendations in the Final Fish and Wildlife Coordination Act are addressed under Section 6 - Public Involvement.

(54) In addition to the recommendation to replace 3-5 acres of bottom land hardwood habitat, as mentioned in paragraph 52, only one other substantial disagreement exists with the recommendations. This pertains to the use of areas along Mill Creek for impervious borrow (Recommendation No. 3). Borrow areas are addressed under the environmental effects of the landward expansion alternative in section 4.

(55) The Environmental Quality (EQ) Plan emphasizes net contributions to the Environmental Quality Account. With mitigation for impacts to approximately 4.5 acres of wetland/slough type habitat, net environmental benefits can be achieved through the deepening of Texas Chute when it is used for hydraulic borrow. This alternative with sand borrow obtained from Texas Chute and deposited on the landward side of the mainstem levee and clay borrow deposited on the landward side of the Mill Creek flank levee, where practical, is designated the Environmental Quality Plan. Some sections of the Mill Creek flank levee require creekside expansion of the levee base to avoid impacting residences and access roads.

(56) The National Economic Development (NED) Plan produces the greatest increase in the value of the nation's output of goods and services, and produces the most improvement to the national economic efficiency. This alternative with sand borrow obtained from Texas Chute and deposited on the landward side of the Mill Creek flank levee, where practical, is designated the National Economic Development Plan. This determination is based on the maximization of net benefits. Benefit and cost derivations can be found in Appendix B - Economics, of the Stage 3 Report.

(57) Executive Order 11990 directs Federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands when practical alternatives exist. Approximately 4 acres of wetland/slough habitat would be impacted along the mainstem levee and approximately 0.5 acre of wetland/slough habitat would be impacted along the Mill Creek flank levee. There are no practical alternatives to these impacts. Landward expansion of the levee base along the mainstem levee and along the Mill Creek flank levee where practical

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rather than riverward expansion and containment dikes during deposition of hydraulic borrow are measures which minimize impacts to wetlands. The deepening of Texas Chute when hydraulic borrow is taken would have an environmental benefit because of consequent improvements to water quality. Deepening sloughs along the Mill Creek flank levee by using them for borrow would similarly benefit these sloughs. The impacts to wetlands are made public through the circulation of the Environmental Impact Statement and through interagency coordination.

(58) Federal responsibilities and responsibilities of the local sponsor under this plan can be found in Section 4 - Plan Implementation, of the Main Report.

COMPARATIVE IMPACTS OF ALTERNATIVES (See Table EIS-2)

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TABLE E15-2

Comparative Impacts of Alternatives

Base Condition and Alternatives	Acceptable and Implementable	Natural Resources	Endangered Species	Cultural Resources	Social and Economic Resources	Benefits to Cost Ratio	Total Costs	Total Benefits
Base Condition	N/A	Extensive forested bottom lands, sloughs, and islands on river side of existing levee are considered valuable fish and wildlife resources. Almost 600 acres of these resources exist within the area considered for protection plus almost 400 acres of water resources.	Bald eagles use shoreline areas along the Mississippi River. River especially areas downstream of L/D 21.	Initial surveys and records have not revealed any sites of significant value.	8-10 businesses concentrated in the NE corner of the District which employ approximately 2,000 people. Less than 700 people reside in the project area of which 3,000 acres is cropland	-	-	-
No Federal Action	Unacceptable because flood damage potential to the area would not change.	No Impact.	No Impact.	No Impact.	Avg. annual damages more than $\frac{1}{2}$ million. Crop damages might occur along with the possible interruption of business operations.	-	-	-
Nonstructural Alternatives								
Evacuation	Unacceptable because of economic infeasibility and social impacts.	No impact in study area. Impacts at relocation sites impacts are unknown.	No impact in study area. Impacts at relocation sites unknown.	No impact in study area. Impacts at relocation sites unknown.	Some businesses or industries unable or unwilling to relocate. Similar situation for some residents. Negative impacts to area income and tax base. Increasing agricultural economics makes abandonment of farmland unlikely.	-	-	-
Floodproofing	Unacceptable because this is not a practical solution to the problem.	No Impact.	No Impact.	Low probability of impact.	Although structures would be protected, high water levels would still interrupt business operations. Agricultural land could not be protected. Evacuation of residents during floods would be necessary.	-	-	-
Flood Warning and Forecasting	Is part of the existing condition.	No Impact.	No Impact.	No Impact.	Same impacts as "floodproofing" alternative except that it is assumed that structures are not protected.	-	-	-
Structural Alternatives								
Raise Existing Levees (140-year level of protection) Sand borrow to the landward side.	Acceptable and implementable	About 55 acres of land would be taken up by the levee expansion. About 4.5 acres are impacts to wetlands. Sand borrow from backwater areas would improve these waters. With improvement of backwater areas and mitigation for impacts to wetlands this is the EQ Plan.	Some construction sites would be within about 250 and 700 feet of bald eagle critical use areas. A proposed hydraulic borrow site would be close to a reported eagle use area, but dredging activities would be restricted to seasons of the year when eagles would not be present.	No significant impact anticipated.	Social and economic benefits are positive. This alternative is designated the NED Plan because net benefits are maximized.	5.1	$ 9,088,000	$46,317,700
Clay borrow to the Riverward side.	Acceptable and implementable	About 40 acres of land, almost all of which has high fish and wildlife value, would be taken up by the levee expansion.	Some construction sites would be within about 250 and 700 feet of bald eagle critical use areas.	No significant impact anticipated.	Social and economic benefits would be positive.	4.8	$10,351,700	$46,317,700
Ring Levees Around Concentrated Ind. and Comm. Development (100-year level of protection)	Unacceptable because it would split the Historic and would be found objectionable by local sponsor. Also, loss of ag. land is high in proportion to area protected.	Levee would occupy about 30 to 35 acres of mostly agricultural ground, several drainage ditches and a disturbed wetland (i.e., a 2-acre pond) would be impacted.	No Impact.	No significant impact anticipated.	Social and economic benefits within the protected area would be positive. This alternative with the 500 level of protection is designated the NED Plan because net benefits are maximized. Several residences and about 3,000 acres of cropland will not be protected.	4.8	$10,900,000	$46,208,000

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GENERAL DESCRIPTION

(59) The study area is in the flood plain of the Mississippi River and is bounded by the Mississippi River on the west, the river bluffs on the east, Curtis Creek on the north and Mill Creek on the south. The area is in west central Illinois immediately south of the city of Quincy, in Adams County, and is politically represented by the South Quincy Drainage and Levee District. A location map is shown on plate 1 of the main report. The district covers about 5,800 acres of which about 3,800 acres is cropland, 165 acres is commercial-industrial-residential, and about 1,835 acres is devoted to surface waters, forested areas, and other uses. An existing levee rings the area and affords protection from the 50-year frequency flood event. The commercial and industrial enterprises are concentrated in the northeast portion of the district; agriculturally used land is dispersed throughout the district; and water resources and forested areas occur in the central and southern portions of the district and riverward of the existing levee. Manmade features of the study area include Lock and Dam Number 21, inland drainage ditches and canals, the pumping station, the existing levee, and the Quincy Wastewater Treatment Facility. The treatment facility has individual ringwall protection for the 500-year-frequency flood event.

NATURAL RESOURCES

(60) The most significant natural resource in the area is the Mississippi River. The river has commercial and recreational importance in addition to its value as a natural resource. The primary commercial use of the river is for barge transportation. Recreational use of the river is diverse and extensive and includes cottages, boating, fishing, camping, hunting, trapping, and swimming. The river in the study area is in a fairly natural state with extensive wooded islands, wooded shorelines, and backwaters between the district levee and the main channel of the river. Only in the northern end of the district near Lock and Dam Number 21 has the shoreline been altered or modified. Terrestrial areas on the river side of the existing levee are wooded and total to about 1,300 acres. The woodlands to the river side of the levee are deciduous trees and are usually a mixture of black willows (Salix nigra), cottonwoods (Populus deltoides), silver maples (Acer saccharinum), and box elders (Acer negundo). The riverside wooded areas are interspersed with backwater areas and sloughs and are a valuable fish and wildlife resource.

(61) Within the area protected by the levee there are about 420 acres of surface waters in the form of ponds, lakes, sloughs, and old river channels, about 10 acres of low or wetlands, and about 590 acres of deciduous forest.

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(62) The forested areas within the protected area are more diverse than the forested areas on the river side of the levee. In addition to the black willows (Salix nigra), cottonwoods (Populus deltoides), silver maples (Acer saccharinum), and box elders (Acer negundo) found outside the area of protection, there are green ash (Fraxinus lanceolata), sugarberry (Celtis laevigata), black cherry (Prunus serotina), eastern redbud (Cercis canadensis), shagbark hickory (Carya ovata), and several types of oaks (Quercus spp). The forested areas tend to be scattered islands within the predominantly agricultural area. Many of the scattered islands of naturally vegetated areas surround inland surface waters like small lakes and ponds. The forested-wetland areas support a diverse assemblage of wildlife and are a valuable natural resource. The inland lakes and sloughs have experienced siltation effects, but do provide recreational fishing benefits. Cabins and boats yield evidence of human use of these areas.

(63) An important natural resource is the limestone bluff found along the eastern boundary of the study area. Limestone is commercially quarried from the bluffs and the limestone formations contribute to well buffered surface waters. Huge caves formed from quarry operations are used for storage areas at the north end of the bluff line.

(64) Curtis Creek runs along the northern edge of the study area 0.6 mile and discharges into the Mississippi River about 0.4 mile upstream from Lock and Dam Number 21. In the area of the project, Curtis Creek is deeper and flows more slowly than it does further upstream. In the deeper, slower, flowing area, the water quality is poorer, the bottom softer, species diversity lower, and the biotic community more tolerant of disturbed or degraded conditions. Further upstream these conditions reverse and the stream is shallower, faster flowing, hard bottomed, and has a more diverse assemblage of organisms more intolerant of poor conditions. This end of the levee district bordering Curtis Creek is the developed area and man-made structures, including the existing levee topped by a hard surfaced road, border the creek.

(65) Mill Creek borders the southern end of the drainage district for about 1.8 miles. For most of this distance Mill Creek is a fast flowing rock-gravel-sand bottom stream with a fairly diverse aquatic community of organisms indicative of good stream conditions. Near the mouth of the creek the water deepens and slows, the substrate becomes softer, and the diversity of the aquatic community lessens. In general, Mill Creek and its flood plain is a good quality natural resource and provides water, wetland, and wooded areas for fish and wildlife of the area.

(66) Water quality of the Mississippi River is moderate-to-good and typically carries a high suspended solids content. Water quality in the upstream areas of Curtis Creek along the north border of the study area is good, but worsens downstream near the mouth of the creek. Along Mill Creek at the south end of the district water quality is typical of a rural stream with only fecal coliform counts being higher than expected. Within the area protected by the levee, water quality conditions at the South Quincy pumping station could typify the district because it is a collection and

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discharge point for interior drainage. Three water quality parameters at the pumping station indicated poor water quality and probably reflected the stagnant water conditions at the pumping station and the agricultural nature of the drainage district. Results of water quality analyses for five locations in the vicinity of the study area are presented in table 3. Water quality standards of the State of Illinois for "General Use Waters" and "Secondary Contact and Indigenous Aquatic Life" waters are shown in tables 4 and 5.

(67) The air quality of the study area and immediate vicinity is generally good. Based on US EPA Region V data (US EPA 1980), Adams County, Illinois, does not meet primary ozone standards, but both primary and secondary standards for sulfur oxides are met. Secondary standards for total suspended particulates are exceeded in the vicinity of the city of Quincy.

(68) Based on Illinois EPA statistics (IEPA 1979), the following statements about air quality for Adams County and the immediate area can be made from data gathered at Quincy during 1979:

Total Suspended Particulates--Of forty 24-hour samples, none exceeded the primary standard (>260 ug/m^3) nor the secondary standard (>150 ug/m^3). The four highest concentrations measured were 129, 117, 112, and 108 ug/m^3.

The annual geometric mean for TSP's from 1974 to 1978 ranged from 57 to 66 ug/m^3. Insufficient data precluded calculating the 1979 geometric mean; however, the short-term trends established prior to 1979 indicate that the levels of particulates in Adams County are low.

Sulfur Dioxide--In 7,569 hourly samples, the standards were not exceeded. The annual arithmetic mean of 0.008 ppm is well within the primary standard of 0.03 ppm and the two highest three-hour averages of 0.171 and 0.0110 ppm were within the secondary limits of 0.5 ppm.

The annual arithmetic mean calculated for 1978 was identical to that for 1979 (0.008 ppm). The short-term trend displayed from 1975 through 1979 shows decreasing levels of sulfur dioxide (0.010, 0.015, 0.009, 0.008, and 0.008, respectively).

Ozone--Based on 5,932 samples, 29 samples were >0.08 ppm with no days in excess of 0.12 ppm. Thus, the NAAQ standards were not exceeded for ozone. The Illinois standard, however, of 0.08 ppm for any one-hour average was exceeded 28 times. During 1978 this same Illinois State standard was exceeded 29 times and there were 75 violations of this standard during 1976. This implies that the levels of ozone have been decreasing since 1976. The highest one-hour average recorded each year has also been decreasing since 1976. These averages for 1976 through 1980 were 114, 135, 124, 103, and 94 ppb, respectively (IEPA 1980).

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It has been shown through correlation of meteorologic data that ozone levels recorded at Adams County may be attributable to the city of St. Louis. Thus the observed air quality in the Adams County area is dependent on wind speed and direction, and the photochemical reactions occurring in and between St. Louis and Adams County.

Lead--The standard is >1.5 ug/m^3 arithmetic mean per calendar quarter; no quarters exceeded this level.

Sulfates, Nitrates, and Metals--A total of seven samples were collected at Quincy for sulfate, nitrate, iron, copper, arsenic, manganese, beryllium, and cadmium analyses. Since the number of samples did not meet minimum statistical selection criteria in 1979, no data are reported.

During 1978, averages of 10 samples yielded the following data (IEPA 1978):

Parameter	Concentration µg/m^3
sulfates	9.20
nitrates	5.40
iron	0.52
lead	0.39
zinc	0.08
copper	0.06
arsenic	0.004
manganese	0.091
beryllium	0.001
cadmium	0.0019

Although standards have been promulgated only for lead (1.5 ug/m^3 quarterly average), the above remaining parameters are of interest. Airborne concentrations of these other compounds are generally associated with particles of respirable size, many possess known toxic properties, and they can act as catalysts in certain atmospheric reactions. Ambient sources include: soils, occurring in varying concentrations; metal processing industries; electric power generating stations; vehicular emissions; and road surface erosion. Highest concentrations are usually associated with industrialized areas (IEPA 1978). A summary of National and Illinois ambient air quality standards is presented in table 6.

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TABLE E15-1

Results of Chemical Analyses of Water Samples Collected From the Vicinity Of South Quincy Drainage and Levee District, Illinois, Study Area, 6 October 1980

	Parameter											
	Biochemical Oxygen Demand (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Orthophosphate-Phosphorus (mg/l)	Soluble Orthophosphate-Phosphorus (mg/l)	Fecal Coliform Bacteria (MPN)	Total Alk. (mg/l as $CaCO_3$)	Turb. (JTU)	Depth(a) (ft)	Temp. (C)	pH	DO(b) (mg/l)	Cond. (umhos @25 C)
Curtis Creek Upper	1.6	0.9	0.003	<0.003	90	169.0	9.9	1	14.66	7.89	5.75	416
Curtis Creek Mouth	3.0	2.8	0.011	0.009	2,400	141.0	29	2.5	15.46	8.12	5.75	341
Mill Creek	1.6	0.3	0.003	<0.003	430	173.0	4.0	1	14.80	7.90	5.79	320
South Quincy Pumping Station	7.4	1.2	0.038	0.048	<30	189.0	37	0.5	16.59	8.13	5.69	370
Mississippi River Quincy, Illinois	1.1	<0.1	1.983	1.900	<30	112.0	67	2	15.74	8.18	5.80	307

(a) Depth from which samples were taken.

(b) Erroneous reading for 6 October 1980 samplings due to probe malfunction.

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TABLE EIS-4

Illinois Water Quality Standards
General Water Uses

General Water Uses. All waters except those designated as Secondary Contact and Indigenous Aquatic Life Waters.

General Standards (parameters)

pH	6.5 - 9.0, except for natural causes
Phosphorus	0.05 mg/l
Dissolved oxygen	Not to drop below 6.0 mg/l at least 16 hours of any period, nor less than 5.0 mg/l at any time
Fecal coliforms	Geometric mean not to exceed 200/100 ml based on minimum of 5 samples taken over 30-day period, nor shall more than 10% of the samples during any 30-day period exceed 400/100 ml
Toxic substances	None shall exceed 1/10 of 96-hour median tolerance limit for native fish or essential fish food organisms except for certain USEPA registered pesticides
Temperature	Not more than 5°F above natural temperatures; not over 60°F for January through March, and December; not over 90°F April through November

Chemical Parameters:

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Ammonia Nitrogen (as N)	00610	1.5
Arsenic (total)	01002	1.0
Barium (total)	01007	5.0
Boron (total)	01022	1.0
Cadmium (total)	01027	0.05
Chloride	00940	500.
Chromium (total hexavalent)	01032	0.05
Chromium (total trivalent)	01033	1.0
Copper (total)	01042	0.02
Cyanide	00720	0.025
Fluoride	00951	1.4
Iron (total)	01045	1.0

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TABLE EIS-4 (Cont'd)

Chemical Parameters: (Cont'd)

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Lead (total)	01051	0.1
Manganese (total)	01055	1.0
Mercury (total)	71900	0.0005
Nickel (total)	01067	1.0
Phenols	32730	0.1
Selenium (total)	01147	1.0
Silver (total)	01077	0.005
Sulfate	00945	500.
Total Dissolved Solids	70300	1,000.
Zinc	01092	1.0

Source: Illinois Pollution Control Board. Adopted 1972. Rules and regulations, chapter 3, water pollution, amended May 24, 1979. The Bureau of National Affairs, Inc., Washington, DC.

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TABLE EIS-5

Illinois Water Quality Standards
Secondary Contact and Indigenous Aquatic Life Standards

Secondary Contact and Indigenous Aquatic Life Waters. Not suitable for general use but can be used for "all secondary contact uses and which will be capable of supporting an indigenous aquatic life limited only by the physical configuration of the body of water, characteristics and origin of the water, and the presence of contaminants in amounts that do not exceed the Rule 205 water quality standards" (Rock River not included).

Secondary Contact and Indigenous Aquatic Life Standards

pH	6.0 - 9.0 except for natural causes
Dissolved Oxygen	Not less than 3.0 mg/l for at least 16 hours in any 24-hour period or less than 4.0 mg/l at any time
Fecal coliform	Based on minimum of 5 samples taken over not more than 30-day period not to exceed geometric mean of 1,000/100 ml nor shall be more than 10% of the samples during any 30-day period exceed 2,000/100 ml
Temperature	Not to exceed 93°F more than 5% of the time or 100°F at any time
Cyanide	Not to exceed 0.10 mg/l
Any substance listed in Rule 205(c) to aquatic life	Not to exceed one-half of 96 hour median tolerance limit for native fish or fish food organisms

Chemical Parameters:

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Ammonia Nitrogen (as N)	00610	2.5 (Apr-Oct) 4.0 (Nov-Mar)
Arsenic (total)	01002	1.0
Barium (total)	01007	5.0
Cadmium (total)	01027	0.15
Chromium (total hexavalent)	01032	0.3
Chromium (total trivalent)	01033	1.0
Copper (total)	01042	1.0
Cyanide (total)	00720	0.10
Fluoride (total)	00951	15.0

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TABLE EIS-5 (Cont'd)

Chemical Parameters: (Cont'd)

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Iron (total)	01045	2.0
Iron (dissolved)	01046	0.5
Lead (total)	01051	0.1
Manganese (total)	01055	1.0
Mercury (total)	71900	0.0005
Nickel (total)	01067	1.0
Oils, fats and greases	00550, 00556 or 00560	15.0 *
Phenols	32730	0.3
Selenium (total)	01147	1.0
Silver	01077	0.1
Zinc (total)	01092	1.0
Total Dissolved Solids	70300	1,500.

* Oil shall be analytically separated into polar and non-polar components if the total concentration exceeds 15 mg/l. In no case shall either of the components exceed 15 mg/l (i.e., 15 mg/l polar materials and 15 mg/l non-polar materials).

Source: Illinois Pollution Control Board. Adopted 1972. Rules and regulations, chapter 3, water pollution, amended May 24, 1979. The Bureau of National Affairs, Inc., Washington, DC.

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TABLE EIS-6

Summary of National and Illinois* Ambient Air Quality Standards

POLLUTANT	TIME OF AVERAGE	PRIMARY STANDARD (AT 25°C and 760 mm of HG)	SECONDARY STANDARD
PARTICULATE MATTER (TSP)	Annual Geometric Mean 24 hour	75 ug/m^3 260 ug/m^3	60 ug/m^3 150 ug/m^3
SULFUR DIOXIDE (SO_2)	Annual Arithmetic Mean 24 hour 3 hour	0.03 ppm (80 ug/m^3) 0.14 ppm (365 ug/m^3) None	None None 0.5 ppm (1,300 ug/m^3)
CARBON MONOXIDE (CO)	8 hour 1 hour	9 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	Same as Primary Same as Primary
PHOTO-CHEMICAL OXIDANTS (O_3)	1 hour - State 1 hour/day - Federal	0.08 ppm (160 ug/m^3) 0.12 ppm (235 ug/m^3)	Same as Primary Same as Primary
NON-METHANE HYDROCARBONS (N-MHC)	3 hour (6 to 9 AM)	0.24 ppm (160 ug/m^3)	Same as Primary
NITROGEN DIOXIDE (NO_2)	Annual Arithmetic Mean	0.06 ppm (100 ug/m^3)	Same as Primary
LEAD (Pb)	Quarterly Arithmetic Mean	1.5 ug/m^3	Same as Primary

* Illinois air quality standards are identical to National air quality standards with the exception of lead for which no State standards exist and for ozone as stated above.

Source: Illinois Environmental Protection Agency. 1979. Illinois air quality report, 1979. Division of Air Pollution Control, Ambient Air Monitoring Section. Springfield, IL.

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(69) The bald eagle (Haliaeetus leucocephalus) is the only federally listed endangered species reported for the study area. Eagles use shoreline areas along the Mississippi River, especially the areas just downstream from Lock and Dam Number 21. The existing levee comes within about 700 feet of these eagle-use areas. Near the mouth of Curtis Creek the levee comes within about 250 feet of shoreline trees reported to be used by eagles and near the mouth of Mill Creek the levee comes within 250 to 500 feet of another reported eagle-use area.

(70) The Higgins' Eye pearly mussel (Lampsilis higginsi) is a large river, deep water mussel on the Federal list of endangered species and could occur in the Mississippi River in the area of the project. A private contractor hired to do an environmental resources inventory of the study area reported that no fresh water mussels listed on the Federal List of Rare and Endangered Species have been reported recently in the vicinity of this study area and no federally listed species of mussels were collected as part of this study.

(71) The Indiana bat (Myotis sodalis), the gray bat (Myotis grisescens), and the Peregrine falcon (Falco peregrinus) are three federally listed endangered species which have historically occurred or could occur in the study area. There are no records or evidence to indicate the presence of these species and the environmental resources inventory conducted by a private contractor suggests these species would occur as transients if present in the study area.

(72) The following endangered species are listed for Adams County in "Endangered and Threatened Species of Illinois" (January 1981) prepared by the Natural Land Institute in cooperation with several agencies and organizations.

Group	Species	Habitat
Mammals	Gray Bat (Myotis grisescens)	Caves
Plants	Sedge (Carex communis)	Open, rocky woods
	*Sedge (Carex prasina)	Wet, sheltered habitats (Found in State Park)
	Prairie White Fringed Orchid (Habenaria leucophaea)	Wet prairies
	Prairie Clover (Lespedeza leptostachya)	Dry gravel and sand prairies
	False Dragonhead (Physostegia intermedia)	Wet prairies, swamps, and sloughs

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Group	Species	Habitat
	Arching Dewberry (Rubus enslenii)	Dry upland forests and sandstone bluffs
	Prairie Spiderwort (Tradescantia bracteata)	Dry prairies; sand areas
	*Buffalo Clover (Trifolium reflexum)	Dry savannas and prairies
	Rock Elm (Ulmus thomasii)	Forested slopes and flood plain forests
	*Arrowwood (Viburnum molle)	Wooded hillsides and limestone bluffs

* Reported to be currently found in Adams County.

CULTURAL RESOURCES

(73) An archaeological reconnaissance of the area proposed for levee improvement was conducted in January and February of 1976 by the Northwestern University Archaeological Progam, Contract Archaeology Office (the institution is now known as the Center for American Archaeology). The survey was primarily a surface investigation with limited subsurface testing by solid core and soil augering where visibility was limited by vegetation.

(74) The survey covered approximately 200 acres of flood plain concentrating on a 100-foot-wide construction zone on the landward side of the levee. Areas designated for borrow at that time were also surveyed. (The areas currently designated as borrow sites along Mill Creek, shown on plate 2, were not included in this survey and will require additional cultural resource investigation to adequately coordinate with the State Historic Preservation Officer. Because these are alluvial settings, deep testing is recommended. Since these are expensive tests and other borrow requirements could preclude the use of these areas, it is considered a wiser use of Federal funds to defer these tests to the detailed design stage of the project following authorization.

(75) No prehistoric material of any kind was located either through field work or collector interview. This is not surprising based on survey work further upstream which shows considerable reworking of flood plain sediments in similar settings. The contractor attributed the lack of sites to destruction by previous levee work or deep burial; the existence of more recent information does not rule out this theory.

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(76) Two historic period sites were located in the survey area. One, a recent dumping site, was not given any consideration as it has no potential for National Register quality. The other site was a house that was removed when the existing levee was constructed. The Principal Investigator reviewed the material associated with the structure and concluded it was not a significant cultural resource.

(77) Both the State Historic Preservation Officer and the Department of the Interior, Interagency Archaeological Services were requested to review the Northwestern University findings in May 1980. Both agencies replied (19 May 1980 and 5 June 1980, respectively) that the conclusions were supportable and the report adequate (appendix C). The Illinois Department of Conservation agreed with the report's assessment regarding the archaeological impacts of the project and stated "the project will have no affect on historic, architectural, or archaeological sites in the area."

SOCIAL

(78) It is estimated that less than 200 people reside in the study area. These residents are scattered throughout the district. Since the district is primarily agricultural, there is little congestion and the forested areas are aesthetically pleasing. In the commercial-industrial enclave in the northern part of the district, noise and activity are normal and the commercial-industrial atmosphere has the expected effect on aesthetics. The commercial-industrial area enhances community cohesion by providing employment and contributing to the tax base.

ECONOMIC

(79) The protected area is dominated by cropland and in 1980 the predominant crops were soybeans, corn, and wheat. About 3,800 acres is used as cropland most of which would be classified as prime farmland. There does not appear to be any large scale production of specialty crops in the district so none of the farmland would be considered unique. Livestock operations tend to be small.

(80) Within the study area, there are about 50 landowners (excluding the US Covernment) of tracts larger than 5 acres. There are 30 tracts of 80 acres or larger being held by 28 separate owners (Land Atlas and Plat Book, Adams County, 1979).

(81) Although there are some absentee landlords, 10 to 15 farm operators live within the drainage district or in the highland just to the east of the district. The average farm operator works about 300 acres. Land prices are $2,500-$3,000 per acre in the bottom lands compared to $3,500 per acre in the uplands. Cash rent ranges from $100 to $150 per acre.

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(82) The commercial and industrial components of the district are concentrated in the northern part of the study area on about 165 acres of ground. There are about 8 to 10 significant businesses and industries which employ about 2,000 people. The Calcium Carbonate Company located withing the study area operates limestone mines in the river bluffs along the east side of the study area. Huge caves formed by quarry operations near the north end of the bluff line are used to store large quantities of material worth millions of dollars.

(83) The general area has a well developed transportation system. Four major highways traverse the area which is serviced by two railroad lines. The Mississippi River is a major transportation route with four barge lines, presently serving the area. Within about 10 miles of the district, there is an airport served by two commercial airlines which offer passenger service. Additional forms of transportation include several bus lines, two taxi companies, and 24 truck lines. The study area is well serviced by the Burlington Northern Railroad and State Highway 57. It is partly because of these services that the commercial and industrial elements of the district are concentrated in the northeast corner.

SECTION 4 - ENVIRONMENTAL EFFECTS

NONSTRUCTURAL PLANS

FLOOD PLAIN EVACUATION

(84) This alternative would have no impact on natural resources, cultural resources, or endangered species. Impacts at the relocation site(s) are unknown.

(85) Severe negative social and economic impacts could result from the relocation of industry. A loss of jobs and income would result for members of the work force unable or unwilling to relocate. The loss of industrial and personal income would consequently be reflected negatively in the tax base.

(86) A negative aesthetic effect and a hazard potential would result from abandoned structures. To reduce or eliminate the negative aesthetic effect and the hazard potential would require expensive wrecking and debris disposal efforts.

(87) Relocation of larger industries would be economically infeasible and at least one industry, the Calcium Carbonate Company, depends on raw materials (limestone) obtained in the area. In addition, there may be a reluctance on the part of affected businesses and industries to construct new facilities at the relocation sites in the face of today's high construction costs. Demand for agricultural products will increase in the future making the abandonment of farmland unlikely.

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(88) Flood plain evacuation could have large benefits for fish and wildlife and recreation resources of the area. Removal of structures and abandonment of farmland would allow wildlife to use the flood plain. This expansion of the fish and wildlife resource would consequently expand recreational use of the area. Removal or partial removal of the existing levee would allow the flood plain to revert to a natural flood plain storage function.

(89) The relocation and abandonment problems associated with this alternative make it unacceptable and non-implementable.

FLOOD WARNING AND FORECASTING

(90) Flood-warning devices usually consist of float switches or similar devices that warn of rising waters. These are useful on smaller, fast rising streams; but the Mississippi River is a large stream and rises more slowly. Adequate forecasting already exists to notify residents and businesses of an impending flood.

(91) Additional flood warning and forecasting would thus not be of special value. During flooding, residents would have to be evacuated; businesses and industries would temporarily close; and economic damages would be sustained by residences, business structures, and croplands.

(92) There would be no impacts to natural resources, cultural resources, or endangered species, but neither would there be any benefits. The status quo would be maintained.

(93) This alternative does nothing to accomplish the project goal of flood damage reduction for the drainage district and is therefore not an acceptable solution.

STRUCTURAL PLANS

RING LEVEES

(94) This alternative considers placing a ring levee around the commercial-industrial area at the north end of the drainage district. The ring levee would use part of the existing 50-year flood protection along Curtis Creek. Modification of this stretch of existing protection (about 0.2 miles) would require placing a concrete floodwall footing into the waters of Curtis Creek. This construction in the waters of the creek would be about 500 feet long. Curtis Creek in this area is changing from a shallow, bedrock substrate to a deeper, slower flowing, soft-bottomed channel which exhibits poor water quality, has a low species diversity, and has organisms present which are considered to be tolerant of poor conditions. Impacts to Curtis Creek associated with this action would not be significant. Further upstream, construction of a new floodwall would be required along the creek for about 0.4 mile. This structure would be set back and would not adversely affect the creek or have significant impacts to terrestrial areas.

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(95) The main part of the ring levee would have about a 270-foot base including a 100-foot berm, be about 2.6 miles long, and would occupy about 65 to 100 acres of ground. The displaced ground will be primarily farm ground used for row crop production and is classified as prime farmland. Additional impacts to approximately 120 to 125 acres of prime farmland would result from excavation for ponding. The levee alignment will also cross several drainage ditches and a disturbed wetland. The disturbed wetland is a 2-acre pond located where the ring levee will join the existing levee along Curtis Creek. The drainage ditches and the disturbed wetland are of marginal quality and of limited value as natural resources. The levee alignment will also require the removal of two residences and several farm buildings.

(96) Borrow for construction of the ring levee would be dry landfill obtained from within the drainage district or from nearby river bluff areas. Impacts associated with borrow activities would be evaluated when borrow site selection became more definitve.

(97) This alternative would afford increased flood protection for the commercial-industrial section of the drainage district, but would not reduce flood damages for the much larger agricultural parts of the drainage district. This solution only partially meets the project goal of flood damage reduction.

(98) This alternative would not have significant impacts to natural resources and no significant impact to cultural resources or endangered species would be anticipated.

RAISE EXISTING LEVEE

(99) This is the preferred alternative. The level of protection receiving the most consideration is protection from the 500-year-frequency flood event. The preferred method of raising the mainstem levee is by deposition of sand borrow obtained from Mississippi River backwater areas. Deposition of sand borrow would be on the landward side of the levee. The alternate method of raising the mainstem levee is to use clay borrow obtained from dry land sites and deposit on the river side of the levee.

RIVERSIDE EXPANSION

(100) Clay fill would be used to expand the existing levee base riverward. The levee base would be expanded about 35 to 40 feet and would require about 40 additional acres. The land taken up by the levee would be bottom land hardwoods with about 50 percent of these characterized as forested sloughs. These forested bottom lands and sloughs are considered valuable fish and wildlife areas.

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(101) Areas along and near the mouth of Curtis Creek at the north end of the district would require expanding the levee base to the landward side or building small concrete floodwalls on top of the levee in order to keep discharge out of the creek. This is generally a disturbed area and will not have any significant impacts. The wooded Mississippi River shoreline about 250 feet away from the levee across the mouth of Curtis Creek is reported to be a bald eagle-use area. The major use areas by eagles are further downstream below Lock and Dam Number 21 and significant impact to bald eagles in this area is not anticipated. Further upstream along Curtis Creek modification of concrete floodwalls and new floodwall construction would be required. Impacts of these actions would not be significant and are discussed in the preceding subsection on "Ring Levees."

(102) Along Mill Creek at the south of the district, expansion of the levee base for most of the upper 1,200 feet of the flank levee would occur by straddling the levee. The alignment would then veer to the landward side and tie into high ground. Landward expansion along this reach would encroach upon a residence and place a road that currently runs along the top of the levee on the creek side of the levee. This road could be the only access road for the house during periods of high water. Creekside expansion along this reach would impact on forested areas of the creek's flood plain, a small wetland/slough area, and may result in discharge into the creek itself.

(103) The American bald eagle (Haliaeetus leucocephalus) is the only federally listed endangered species reported for the project area. Lock and Dam Number 21 is in the northern part of the project area and major use areas are wooded shorelines below the lock and dam. Construction activities would come within about 700 feet of these areas. Near the mouth of Curtis Creek at the north end of the district, construction activities will come within about 250 feet of a reported eagle-use area. Human activity is normal because this stretch of the levee has a paved road running along its top. At the south end of the mainstem levee near the mouth of Mill Creek the levee comes within about 250 to 500 feet of another reported eagle-use area. The expanse between the levee and the shoreline is heavily wooded and provides a good screen between the eagle-use area and the levee. Because of the distance between construction activity sites and reported eagle-use areas, normal human activity near the mouth of Curtis Creek and the wooded screen between the levee and reported eagle-use areas at the mouth of Mill Creek, no impacts to bald eagles would be anticipated.

(104) A cultural resources survey conducted during the winter of 1975-76 focused on landward expansion of the levee. The survey results indicate that no significant impact to cultural resources of the area would result from this alternative. Land areas currently designated as borrow sites along Mill Creek, shown on plate 2, were not included in this survey and will require additional cultural resource investigation to adequately coordinate with the State Historic Preservation Officer. Because these are alluvial settings, deep testing is recommended. Since these are expensive tests and other borrow requirements could preclude the use of these areas, it is considered a more eficient use of Federal funds to defer these tests

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to the detailed design stage of the project following authorization. The economic and social impacts of this alternative would be positive. Flood damages would be reduced throughout the drainage district. The need for evacuation of residents during floods would be reduced with a consequent psychological benefit from the security of increased flood protection.

(105) Borrow for raising the main portion of the levee would come from sites within the drainage district or in nearby bluff areas. Borrow for the Mill Creek portion of the levee raise could come from the creek side of the levee. Creekside borrow areas along Mill Creek are described under Landward Expansion; paragraph 123. Selection of borrow sites for raising the main portion of the levee would be finalized in later planning stages and the impacts associated with borrow activities would have to be further evaluated at that time.

LANDWARD EXPANSION

Natural Resources

(106) This alternative would use sand borrow from Texas Chute to expand the mainstem levee base to the landward side. The levee base would be extended about 50 feet and would occupy about 55 additional acres (including expansion along Mill Creek). The greatest portion of this expansion would be into pasture and cropland. The cropland which would be affected is classified as prime farmland. At one point in the central part of the drainage district and at another in the southwest part of the district the landward expansion of the levee will encroach upon forested and wetland areas. This encroachment would amount to about 4 acres of bottom land hardwoods and 4 acres of wetland/slough type habitat An additional 0.5 acre of wetland/slough type habitat would be impacted by creekside expansion along Mill Creek (paragraph 109).

(107) The upper end of the flank levee along Curtis Creek at the north end of the district requires concrete floodwalls. About 0.2 mile of concrete floodwall already exists and would be raised. Upstream from this about 0.4 mile of new concrete floodwall would be constructed. For a short section where flood protection already exists, it would be necessary to place the footing for the modified floodwall in the waters of the creek. Upstream the construction of new floodwalls would be set back far enough to not encroach upon the creek. The impacts of these actions to the creek or the surrounding terrestrial area are not considered significant and are discussed under the preceding section on "Ring Levees."

(108) The placing of concrete into Curtis Creek for the construction of floodwalls, the dredging to obtain hydraulic borrow, and wetland impacts requires processing under Section 404 of the Clean Water Act. The preliminary Section 404 Evaluation Report is attached to the FEIS. Circulation of the FEIS will constitute public review of the preliminary Section 404 Evaluation.

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(109) Along the 6,200-foot section of Mill Creek impervious fill will be used to raise the levee; about 6 acres of land would be taken up by expansion of the levee base. For the lower 5,000 feet of this stretch, about 2,500 feet of the expanded levee base will be to the landward side. For the other 2,500 feet, expansion of the levee base will be towards the creekside in order to avoid encroaching upon a farmstead and to keep a residential access road on the landward side of the levee. For the upper 1,200 feet, expansion will straddle the levee and then veer to the landward side where the levee ties into high ground near Highway 57. Straddling the levee is necessary in this area because creekside expansion would encroach upon Mill Creek and landward expansion would encroach upon a residence. Expansion to the creedside impacts less than 2 acres of bottom land wooded areas and about 0.5 acre of wetland/slough type habitat. Expansion to the landward side impacts areas used for agriculture. The agricultural land which would be impacted is classified as prime farmland. Clay borrow could most economically be obtained on the adjacent creekside of the levee. This would have impacts similar to the creekside expansion of the levee base except that with the passage of time the borrow areas would reestablish as wildlife areas whereas land occupied by the levee would not. Clay borrow obtained from areas within the drainage district or from nearby bluff areas would have higher costs.

(110) The bald eagle (Haliaeetus leucocephalus) is the only federally listed endangered specie reported for the project area. At one point near the mouth of Curtis Creek at the north end of the district, construction activities would come within about 250 feet of an area reported to be used by eagles. The levee here is separated from the eagle-use area by the mouth of Curtis Creek. A paved road runs along the top of the levee so noise and activity here is not unusual. Disturbance to eagles from construction activities should be minimal. At another point near Lock and Dam Number 21, construction activities would come within about 700 feet of an eagle-use area. This should be far enough away to avoid any major disturbance to the bald eagle. At the south end of the mainstem levee near the mouth of Mill Creek, the levee comes within about 250 to 500 feet of another reported eagle-use area. The expanse between the levee and the shoreline is heavily wooded and provides a good screen between the eagle-use area and the levee. Hydraulic dredging activities would be at least 1,000 feet from reported eagle-use areas except at one proposed dredging site at the south end of the mainstem levee. Dredging activities at this site would come close to a reported eagle-use area. Dredging activities, though, would be restricted to seasons of the year when eagles would not be present. Thus, because of the distances of construction activities from eagle-use areas, the normal presence of human activity at the north end of the mainstem levee near the mouth of Curtis Creek, the wooded screen between the levee and reported eagle-use areas at the mouth of Mill Creek, and the restriction of dredging activities to seasons of the year when no eagles would be present, no significant impact to bald eagles is anticipated. A letter from the US Fish and Wildlife Service, Office of Endangered Species, supporting this determination can be found in Appendix C, Pertinent Correspondence.

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(111) In addition to the bald eagle, four endangered species are listed for Adams County in "Endangered and Threatened Species of Illinois," January 1981, prepared by the Natural Land Institute in cooperation with several agencies and organizations. From habitat descriptions, only one species seems to have the potential for being disturbed by the project. This is:

Sedge (Carex prasina)

The closest location for which this species has been reported in Adams County is approximately 6 miles north of the project area. Therefore, no impact to any State of Illinois listed endangered species is anticipated. Coordination with the State on endangered species has been made but no comment has been received.

(112) Executive Order 11990 directs Federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands when practical alternatives exist. Approximately 6 acres of wetland/slough habitat would be impacted along the mainstem levee and an approximate 0.5 acre would be impacted along the creekside of the Mill Creek flank levee. These impacts are unavoidable. Expanding the levee base in the opposite direction along the mainstem levee would have greater wetland/slough impacts and doing so along the Mill Creek flank levee would encroach upon a farmstead. The project is thus considered to be in compliance with Executive Order 11990.

Cultural Resources

(113) An archaeological reconnaissance was performed in January and February of 1976 under private contract. The survey covered approximately 200 acres of flood plain concentrating on a 100-foot-wide construction zone on the landward side of the levee. No prehistoric material of any kind was located either through field work or collector interview. Survey work upstream shows considerable reworking of flood plain sediments in similar settings, supporting these findings. The contractor attributed the lack of sites to destruction by previous levee work or deep burial. More recent information does not rule out this theory. Two historic period sites were located in the survey area. One, a recent dumping site, had no potential for National Register quality. The other site was a house that was removed when the existing levee was constructed. Upon review, it was concluded that the structure was not a significant cultural resource. Both the State Historic Preservation Officer and the Department of the Interior, Interagency Archaeological Services reviewed the findings and viewed the conclusions of the survey as supportable and the survey report as adequate. The Illinois Department of Conservation agreed with the survey report's assessment regarding archaeological impacts and stated "...the project will have no affect on historic, architectural, or archaeological sites in the area." Land areas currently designated as borrow sites along Mill Creek, shown on plate 2, were not included in this survey and will require additional cultural resource investigation to adequately coordinate with the State Historic Preservation Officer.

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Because these are alluvial settings, deep testing is recommended. Since these are expensive tests and other borrow requirements could preclude the use of these areas, it is considered a more efficient use of Federal funds to defer these tests to the detailed design stage of the project following authorization.

Economic Impacts

(114) The net economic impacts of the selected plan are positive. A significant negative impact is to about 45 acres of pasture and cropland which will be lost to agricultural use by expansion of the levee base. Cropland within the district is generally considered to be prime farmland.

(115) The project goal of flood damage reduction for the drainage district would be realized. The commercial-industrial concentration in the northeastern part of the district and the agricultural pursuits througout the rest of the district would receive additional protection. The interruption of business and agricultural activities because of floods would be less likely. This will consequently contribute to the security of personal and industrial income with positive effects on the tax base. Flood protection would encourage investment and maintenance in existing businesses.

Social Impacts

(116) The presence of the existing levee has a negative aesthetic effect because it obstructs the view of the river and the forested flood plain. Increasing the height of the levee will increase this negative aesthetic effect but to a much lesser degree than initial levee construction.

(117) In the industrial-commercial northeast part of the district noise and activity are common so these aspects of construction will not be especially disturbing. The rest of the district is predominantly agricultural and noise and activity are not commonplace. Since the noise and activity associated with construction would be concentrated in an area away from most residences, there should be no significant impact.

(118) Increased flood protection would contribute positively to community cohesion. Employment and area income would be more assured. The business-industrial community would have an increased sense of security, and farmers would be less susceptible to catastrophic crop damages during flood events.

(119) Community growth would be encouraged. Since this is already a protected area, the extent of community growth would be limited.

(120) No people will be displaced by this alternative.

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Borrow Areas

(121) The source of sand borrow for the mainstem levee will be Texas Chute, a Mississippi River backwater area on Ward Island. Dredging of Texas Chute would severely impact the benthic community. However, an environmental resources inventory of the project area, dated April 1981, collected only two groups of organisms from Texas Chute: Chironomidae and Oligochaeta. The low diversity was attributed to low flow and substrate type. Texas Chute has experienced sedimentation impacts over the years and as a result is only a fraction of its former depth. Texas Chute was selected as an hydraulic borrow site because it was one of the backwater areas specified by the GREAT II Side Channel Work Group which could benefit from deepening its water.

(122) Pervious borrow will also be obtained from Mississipi River backwater areas near the mouth of Mill Creek and from sloughs along the Mill Creek flank levee. Dredging the backwater areas near the mouth of Mill Creek would severely impact benthic communities. Benthic communities would reestablish after dredging has ceased. Dredging these areas would deepen them with consequent improvements in water quality. Dredging sloughs along the Mill Creek flank levee which have been impacted by sedimentation, will deepen them with consequent improvements in water quality.

(123) Impervious borrow for the Mill Creek flank levee would be obtained from four areas along Mill Creek:

Site No. 1 - Available information indicates that material would be suitable. Of the total area 80 percent is open, marginal farmland, and 20 percent is sparse-to-medium dense silver maple (Acer saccharinum), cottonwood (Populus deltoides), box elder (Acer negundo), and willow (Salix sp.) association. The site encompasses 5 acres. Depending on suitability of material and depth of material the site will provide a large percentage of material needed. Following removal of borrow the site will be shaped and graded. Initial seeding and natural succession of the site will encourage an accelerated wetland development. Development of this site into a wetland is the project mitigation plan for impacts to wetland/slough type habitat.

Site No. 2 - This area covers about 5 acres. Vegetative cover consists of a mixed stand of bottom land shrubs and trees. Stand density is medium-to-dense grading from willow (Salix sp.) and silver maple (Acer saccharinum) along the creek to maple (Acer sp.) and cottonwood (Populus deltoides) on higher ground. Determination of the extent of use for borrow will be related to tree size for economic and environmental reasons. The type of habitat on this site is found in great abundance along the shoreline and island area in the general vicinity.

Site No. 3 - This area covers about 6 acres. Stand density is medium and of a more mature maple (Acer sp.)/cottonwood (Populus deltoides) association. Canopy closure allows for only a minimum understory and a limited ground cover. Because of tree size this area will only be used if

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adequate material cannot be obtained from areas 1 and 2. Again, the type of habitat disturbed is in abundance on adjacent lands.

Site No. 4 - This is a low area along the existing levee and comprises approximately 2 acres. Exisiting vegetation consists of a maple (Acer sp.)/willow (Salix sp.) association. Natural succession in this area, if it is utilized will provide a lineal diversity of habitat in an otherwise mono-type habitat.

Mitigation in kind is not recommended for the approximate 14 acres of wooded areas because of the vast acreages of identical habitat along the river corridor.

SECTION 5 - LIST OF PREPARERS

(124) The following people were primarily responsible for preparing this Draft Environmental Impact Statement:

Name	Discipline	Experience	Role in EIS Preparation
Marvin Williams	Civil Engineering Technician	15 Years Federal Planning Experience	Study Manager
Mark Schroeder	Civil Engineer	11 Years Federal Planning Experience	Study Manager
Bob Vanderjack	Biologist (Aquatic Biology-Fisheries)	2 Years Preparation of Environmental Documents	Coordinated and Compiled EIS
Roy Eichhorn	Archaeologist	2 Years Coordination and Conduction of Archaeological Studies	Coordinated Archaeological Impact Studies
Ecological Analysists, Sparks, Maryland	Environmental Consulting Firm	Considered Qualified for Environmental Consultation	Environmental Resources Inventory
Northwestern University Archaeological Program, Contract Archaeology Office (Center for American Archaeology)	University Contract Archaeology Program	10 Years Illinois Archaeology	Cultural Resources Survey

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(125) An initial public meeting was held in June of 1971 to obtain views of local interests. Strong local support for a higher degree of flood protection was expressed at the meeting. Several meetings with officials of the drainage district and representatives of other concerned agencies have been held. A public meeting to explain alternatives and obtain public views was held in August 1976.

(126) Prior to the present stage of planning, coordination with Federal and State agencies has included:

* US Department of the Interior
* US Department of Agriculture
* US Environmental Protection Agency
* State of Illinois, State Clearing House

(127) During the present stage of planning, coordination is in progress with:

* US Fish and Wildlife Service, Ecological Services and Endangered Species
* Illinois Department of Conservation, Fish and Wildlife Resources
* Illinois State Historic Preservation Officer
* US Environmental Protection Agency

(128) This Final Environmental Impact Statement is being sent to Federal, State, and local government agencies, as well as private groups and individuals, for comment. The document distribution list is a part of the planning document. Coordination with interested agencies and individuals will be maintained as the study continues.

(129) The following public views and actions have influenced the course of the study:

* Detailed studies were made for alternatives which were favored by the public at the alternatives public meeting.
* Selection of pervious material borrow areas was based on requests by the US Fish and Wildlife Service.

(130) The US Fish and Wildlife Service Draft and Final Coordination Act Reports can be found in Appendix C - Pertinent Correspondence of the Main Report. The draft report contained the following recommendations for the recommended alternative:

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Mitigation:

1. Loss of about 2-4 acres of wetlands/slough habitat will require in-kind mitigation within the drainage district for the number of acres filled.

2. Loss of 3-5 acres of bottom land hardwoods will require in-kind mitigation for the number of acres lost within the drainage district. Bottom land hardwood replacement should include planting trees and shrubs beneficial to wildlife (like mast or fruit producers). Replacement could be satisfied by planting approximately 1 mile of buffer at least 50 feet wide along the inside (landward) toe of the levee (see attachment 5).

3. All the forested sloughs within the levee district should be permanently protected from cutting, burning, draining, or filling through zoning, easements, or other means.

Enhancement:

1. Sand borrow from the river should be taken from Beebe Island side channel, Texas Chute, possibly Fabius Island side channel, or other locations recommended by the GREAT II Side Channel Work Group to enhance the aquatic resources.

2. Silt from the dredging should be stored and then graded over the finished levee to provide a substrate for seeding desirable grass or plant species.

3. Do not mow the levee before 1 August of each year.

Recommendations 1 and 2 under "Mitigation" were carried forward to the Final Report and will be addressed under paragraph number 132. Recommendation 3 under "Mitigation" is ordinarily beyond project planning capability and the political jurisdiction of the drainage district since the lands recommended for protection by easement are under private ownership and the zoning laws would be under county jurisdiction. Recommendations 1 and 3 under "Enhancement" will be incorporated into the project design. Recommendation 2 under "Enchancement" would not contribute to the stability or design of the structure, and since sufficient detailed data does not exist at this stage of planning to make engineering and economic determinations on the feasibility of complying with the recommendation, it would be held in obeyance until the detailed design stage of the project following authorization. At that time the engineering and economic aspects of the recommendation would be weighed against potential benefits to determine if it is an economically and environmentally feasible option.

(131) On 11 June 1982, a meeting was held with a representative of the US Fish and Wildlife Service to discuss impacts to natural resources. Borrow areas along Mill Creek and mitigation for project impacts were discussed.

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(132) The Final Fish and Wildlife Coordination Act contained 8 recommendations. Each recommendation with the Rock Island District's response follows:

1. Loss of wetland habitat through filling for levee expansion should be offset by borrowing for clay fill in a manner beneficial to fish and wildlife.

Wetland loss to be offset within the District approximates 4 acres. Additional Mill Creek wetland loss ranges from about 0.5 acres for creekward and landward expansion to 2.0 acres for primarily creekward expansion. Methods to offset the 4.6-6.0 acre wetland loss should include borrowing from farmland adjacent to the Mill Creek corridor, dredging from sloughs adjacent to Mill Creek, or dredging from sloughs within the District. Selection, design, and revegetation of borrow sites should be done in coordination with the Illinois Department of Conservation (IDOC) and our Rock Island Field Office. If the farm land borrow site is used, it should be permanently protected from cutting, burning, draining or filling. If a Mill Creek slough is used, a downstream cut should be made to connect the slough with the stream for fisheries use. If sloughs within the district are used for borrow, dredging, and deepening should enhance the area for waterfowl.

Response: Expansion of the levee base along Mill Creek will be creekward and landward with 0.5 acre of wetland impacts. In conjunction with 4 acres of wetland/slough impacts along the mainstem levee, total wetland/slough impacts will be 4.5 acres. Mitigation for these impacts will come from the use of an approximate 5-acre area along the creekside of the Mill Creek flank levee for impervious borrow. This area (described under paragraph 123) is approximately 80 percent open, marginal farmland, and 20 percent sparse-to-medium-dense silver maple (Acer saecharinum), cottonwood (Populus deltoides), and willow (Salix sp.) association. Following removal of borrow the site will be shaped and graded. Initial seeding and natural succession of the site will encourage an accelerated wetland development. Since this area will be outside of the protected area and filling would be expensive, the economic incentives to cut, burn, drain, or fill the area are not anticipated. Thus, the most likely future condition is for the area to remain undisturbed. The project costs to purchase this area in order to permanently protect it are not considered to be justified. As a result of the 11 June 1982 meeting between Rock Island District personnel and a representative of the US Fish and Wildlife Service, sloughs along the Mill Creek flank levee have been designated as borrow areas. Although this is not part of the mitigation plan the use of the sloughs will have net positive environmental effects as mentioned in Recommendation 1 above. The US Fish and Wildlife Service, Rock Island Field Office and the Illinois Department of Conservation would be consulted in the selection of sloughs to be used for borrow.

2. Loss of 3-5 acres of bottom land habitat will require replacement for the number of acres lost by planting trees and shrubs beneficial to wildlife (like mast or fruit producers).

Response: It is the Rock Island District position that this type of habitat is abundant in the project area and because of the vast acreages

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of this type, habitat along the river corridor mitigation for this impact is not justified.

3. Except for filled slough areas, Mill Creek riparian habitat should not be used for borrow.

Response: Mill Creek borrow sites are described in paragraph 123. Impacts from these sites for borrow are not considered to be significant for the same reasons given under Recommendation 2 above; i.e. this type of habitat is abundant in the project area and vast acreages of this type of habitat are present along the river corridor. In addition, with the passage of time the borrow areas will reestablish as wildlife areas.

4. Sand borrow from the river should be taken from Beebe Island side channel, Texas Chute, or other locations recommended by the GREAT II Side Channel Work Group Appendix to enhance aquatic resources.

Final borrow selection should be coordinated with IDOC and our Rock Island Field Office.

Response: This recommendation has been incorporated into the project design. Texas Chute has been designated for hydraulic borrow.

5. The Mill Creek flank should be raised along the landward side to the extent feasible.

In particular, the 2,500' bluffward of approximate station 405+00 should be enlarged along the landward side.

Response: This recommendation has been incorporated into the project design.

6. Sand levee expansions should be done in a manner to minimize fill spillage into the sloughs.

Berms should be constructed to direct run-off away from the sloughs.

Response: Sand dikes to contain hydraulic borrow during sand levee construction are a standard practice. Water that seeps through the sand dikes is usually clear with little particulate suspended material.

7. Work performed in Curtis Creek should be done in a manner to minimize disturbance.

The vegetation along the north bank of Curtis Creek should not be removed. Riprap placed on the Curtis Creek levee near Indian Mounds Park should be planted with vines to minimize aesthetic impacts to the park.

The Rock Island District agrees with the recommendation except that planting vines in the riprap is not considered necessary. If the rirap or its periphery is a suitable substrate, volunteer vegetation will accomplish the same purpose.

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8. We encourage the seeding of the sand levee with prairie grasses.

Response: A substantial amount has been requested in the project budget for seeding the levee. This would include the sand mainstem levee which is an innovative request. Seeding the sand levee is anticipated to have positive construction, engineering, and environmental benefits.

(133) Letters pertaining to cultural impacts from the United States Department of the Interior, Heritage Conservation and Recreation Service, and the Illinois Department of Conservation, National Register Archaeologist (who represents the State Historic Preservation Officer), can be found in Appendix C - Pertinent Correspondence. Both agencies support the determination that the preferred alternative will not significantly impact cultural resources of the area.

(134) The distribution list for the project report, including the Environmental Impact Statement, can be found at the back of the Main Report.

(135) The following comment letters have been received in response to the Draft Environmental Impact Statement:

(1) Letter from Cooper Petroleum Equipment Division, Cooper Industries, dated 12 April 1982, supporting the project.

(2) Letter from General Counsel of the United States Department of Commerce, dated 6 May 1982, with attached letter from the US Department of Commerce, National Oceanic and Atmospheric Administration, dated 14 April 1982. The N.O.A.A. letter advises of the possible presence of geodetic control survey monuments in the project area and requests sufficient notice in order to relocate them if they will be disturbed or destroyed.

(3) Letter from the US Fish and Wildlife Service, Office of Endangered Services, dated 12 May 1982, commenting on impacts to natural resources and content of the DEIS.

(4) Letter from the US Environmental Protection Agency, Region V, Environmental Review Branch, Planning and Management Division, dated 13 May 1982. The letter comments on project alternatives and impacts.

(5) Letter from the US Environmental Protection Agency, Region V, Environmental Review Branch, Planning and Management Division, dated 14 May 1982. The letter comments on project alternatives and impacts.

(6) Letter from the Illinois Department of Conservation, dated 17 May 1982, with information that their comments are forthcoming.

(7) Letter from the State of Illinois, Bureau of the Budget, dated 19 May 1982, with attached letter from the Illinois Department of Agriculture, Division of Natural Resources, dated 17 May 1982. The Illinois Department of Agriculture letter comments favorably on the project.

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(8) Letter from Illinois Department of Transportation, Division of Water Resources, dated 17 May 1982, which coordinated Illinois State Agency review of the DEIS, dated 1 June 1982 with comment letter from the Illinois Department of Conservation. The Illinois DOT letter commented favorably on implementation of the project and the Illinois DOC letter commented on the report contents and project impacts.

(9) Letter from State of Illinois, Bureau of the Budget, dated 7 June 1982, with letter from the Illinois Department of Conservation, dated 17 May 1982, attached. The Illinois DOC letter commented on the content of the DEIS and natural resource impacts.

These letters, with responses, follow as the final pages of the Public Involvement section of the EIS.

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COOPER PETROLEUM EQUIPMENT DIVISION

April 12, 1982

Dept. of the Army
Rock Island District Corps of Engineers
Clock Tower Bldg.
Rock Island, Illinois 61201

Attention: Doyle W. McCully, P.E.
Chief, Engineering Div.

Subject: South Quincy Flood Study NCRED-FB

Dear Sirs:

1. We support the selected plan of a 500 year protection for the existing South Quincy Drainage and Levee District as shown in the interim report 3 - plate 2. However, the federal/now federal funding responsibilities will need to be accurately determined.

Yours truly,

L. Miller
Plt. Facilities/Maint. Mgr.

LM/kw

DIVISION OF COOPER MACHINERY GROUP

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Response to 12 April 1982 letter from Cooper Petroleum Equipment Division, Cooper Industries.

1. Noted.

GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D.C. 20230

MAY 6 1982

Mr. Doyle W. McCully, P.E.
Chief, Engineering Division
Department of the Army
Rock Island District
Clock Tower Building
Rock Island, Illinois 61201

Dear Mr. McCully:

1. This is in reference to your draft environmental impact statement entitled "Mississippi River Coon Rapids Dam to Ohio River." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving four copies of the final environmental impact statement.

Sincerely,

Robert T. Miki
Director of Regulatory Policy

Enclosure: Memo from Robert B. Rollins
National Ocean Survey
National Oceanic and Atmospheric
Administration

Response to 6 May 1982 letter from General Counsel of the United States Department of Commerce.

1. Noted.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

April 14, 1982

TO: PP/EC - Joyce M. Wood

FROM: OA/C5 - Robert B. Rollins

SUBJECT: DEIS 8204.14 - Mississippi River, Coon Rapids Dam to Ohio River Feasibility Study for Flood Damage Reduction

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments. For further information about these monuments, please contact Mr. John Spencer, Director, National Geodetic Information Center (OA/C18) or Mr. Charles Novak, Chief, Network Maintenance Branch (OA/C172), at 6001 Executive Boulevard, Rockville, Maryland 20852.

10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration
A young agency with a historic tradition of service to the Nation

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Response to 14 April 1982 letter from United States Department of Commerce, National Oceanic and Atmospheric Administration.

1. Noted.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ROCK ISLAND FIELD OFFICE (ES)
1830 Second Avenue, Second Floor
Rock Island, Illinois 61201

IN REPLY REFER TO:
Commercial 309-793-5800
FTS 360-5800

May 12, 1982

Colonel Bernard P. Slofer
District Engineer
U.S. Army Engineer District
Rock Island
Clock Tower Building
Rock Island, Illinois 61201

Dear Colonel Slofer:

This responds to your March 31, 1982, request for comments on the Feasibility Study for Flood Damage Reduction, South Quincy Drainage and Levee District, Illinois.

General Comments

1. The document adequately describes the existing resources but does not adequately treat potential project impacts on these resources. The document discusses Executive Order 11988-Floodplain Management, but we could not find a discussion of Executive Order 11990-Protection of Wetlands. In particular, the following items (summarized from Digest of Water Resources Policies and Authorities, p. 19-2, 27 March 1981, U.S. Army Corps of Engineers) should be discussed:

   1. Is there a practicable alternative to the action?
   2. If construction must occur in wetlands, what practical measures to minimize harm to wetlands will be undertaken?
   3. What efforts will be made to preserve and enhance the natural and beneficial values of wetlands?
   4. What efforts are being made to inform and involve the public concerning new construction in wetlands?

2. The document does not appear to be consistent with the Corps' own fish and wildlife mitigation policy (DAEN-CWR-P, 12 March 1980). Section 3a(4) of the the policy states that in the final report, recommendations by fish and wildlife agencies which are modified or rejected must show documentation of "...having held conferences or otherwise attempted to secure reconciliation of differences...". We have not yet been contacted regarding problems you may have with our mitigation recommendations. We assume this will be done before submission of your final report.

The Corps' fish and wildlife mitigation policy also states in 3b(3)c(3): "One type of fish and wildlife benefit will not be used as an offset for another type of fish and wildlife damage, nor will only the net effect be

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Response to 12 May 1982 letter from US Fish and Wildlife Service, Office of Ecological Services.

1. Noted and discussed in paragraphs 57 and 112 of the Final Environmental Impact Statement (FEIS).

2. A Meeting was held with a representative of the US Fish and Wildlife Service, Office of Ecological Services, on 11 June 1982, in which mitigation was a primary topic of discussion.

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3. shown." The first sentence in the summary of the draft environmental impact statement (DEIS) implies that benefits achieved from dredging the backwaters for borrow will mitigate the loss of about 8 acres of wetlands and their associated habitats.

We recommend these inconsistencies be properly treated in the final document.

Specific Comments

4. Page 10, paragraphs 4 and 5: The increased basal widths for both the sand and clay levees should be given.

5. Page 12, paragraph 3: Obtaining clay borrow from the creek side of the Mill Creek flank may significantly deplete wildlife in the Mill Creek corridor.

6. Paragraph 6. Would a right-of-way be needed for riverside levee expansion along the Mill Creek flank?

7. Summary, DEIS, paragraph 1: Dredging the backwaters does not mitigate wetland habitat loss.

8. Paragraph 5: We do not consider our mitigation recommendations to be a minor issue. We are willing to work with your staff toward a reasonable resolution of problems which may arise from implementation of our recommendations.

9. EIS-II (55): Definition of the proposed EQ plan should also include river-side placement of clay fill along the Mill Creek flank. Statement (55) implies landward fill placement only.

We appreciate this opportunity to provide comments on your draft document.

Sincerely,

Thomas M. Groutage
Field Supervisor

cc: IDOC (Lutz, Bertrand)
IEPA
USEPA
KIAO
NO

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3. The first paragraph in the summary has been modified to show that environmental benefits occurring as a result of borrow activities in backwater areas are not considered a part of the mitigation effort.

4. Noted and entered in report.

5. Use of a small agricultural field along Mill Creek for borrow with appropriate shaping, grading, and seeding afterwards constitutes the project mitigation plan for wetland/slough impacts. Impacts to other Mill Creek borrow areas are not considered significant. Mill Creek borrow areas are discussed in paragraphs 123 and 132 of the FEIS.

6. Right-of-way requirements are incorporated into the levee raise plans.

7. Agreed.

8. Noted. No disagreement.

9. Noted and incorporated into appropriate section of FEIS. Riverside expansion along the Mill Creek flank will occur only where landward expansion is not practical.

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UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604

REPLY TO ATTENTION OF

13 MAY 1982

Mr. Doyle W. McCully, P.E.
Chief, Engineering Division
Rock Island District, Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

RE: South Quincy Drainage & Levee District

Dear Mr. McCully

Your letter of April 27, 1982, asked for our concerns on the proposed levee raising alternative for the flood damage reduction project being considered in the South Quincy Drainage and Levee District (Adams County, Illinois). Since we are not very familiar with the area's environment, our comments will be somewhat general.

1 The U.S. Environmental Protection Agency prefers floodplain evacuation and non-structural alternatives for flood damage reduction projects. Flood damage reduction measures such as these are consistent with the objectives of Executive Order 11988 - Floodplain Management, and are less environmentally damaging than structural alternatives. Structural alternatives often adversely impact the environment and require mitigation.

2 The structural alternative of raising the existing main stem levee along the Mississippi River will result in the direct loss of about 50 acres of floodplain, and an increase in flood heights and flow velocities due to floodplain constriction. Additionally, the areas from which levee construction material is obtained will be adversely impacted by the loss of vegetation and by erosion and siltation. Therefore, we recommend that the project's impacts be mitigated.

3 It is proposed that borrow materials be obtained from a portion of Texas Chute, the mouth of Mill Creek, and several sites adjacent to Mill Creek. Since many backwater areas along the Mississippi River have been degraded by sedimentation, the use of these areas for borrow material may result in some environmental enhancement. Borrow should be obtained as carefully as possible, and from areas where sediment removal would result in habitat and water quality improvement. When work in these areas is complete, the soils of the banks and haul roads should be stabilized with an appropriate vegetative cover. The borrow areas adjacent to Mill Creek should be connected to the Creek and managed as floodplain wetlands. These areas could then filter pollutants from Mill Creek before they enter the Mississippi River. As usual, we also recommend that all areas where the soil has been disturbed be revegetated with appropriate native species.

Thank you for coordinating this project with us. Please keep us informed of its progress. Also, we would appreciate the opportunity to review and comment on any environmental assessments prepared for this project when they are available. If you have any questions about our review or comments, please call Mr. James Hooper of my staff, at 312/886-6698.

Sincerely yours,

Barbara Taylor Bradley

Barbara Taylor Bradley, Chief
Environmental Review Branch
Planning and Management Division

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Response to 13 May 1982 letter from
US Environmental Protection Agency, Region V.

1. Nonstructural alternative are discussed in both the Main Report and the EIS.

2. Environmental effects of the selected plan are discussed in Section 4 of the FEIS and mitigation is discussed in paragraph 132 of the FEIS.

3. The selection of hydraulic borrow sites in a manner which will have positive environmental benefits is incorporated into project plans. The vegetation and stabilization of areas disturbed by project activity is a standard policy and would be incorporated into the project contract. A 5 acre site along the creekside of the Mill Creek flank will be shaped, graded, and seeded after borrow activities have ceased to encourage wetland development. This site is discussed under paragraphs 123 and 132 of the FEIS.

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UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604

REPLY TO ATTENTION OF:

14 [illegible]

Mr. Doyle W. McCully, P.E.
Chief, Engineering Division
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

RE: NEPA-DE-COE-F36082-IL-(82044)

Dear Mr. McCully:

We have completed our review of the Draft Environmental Impact Statement (EIS) for Flood Damage Reduction, South Quincy Drainage and Levee District, Illinois.

The tentatively selected plan involves raising the existing levee 35 feet with expansion of the levee base by the deposit of sand borrow on the landward side of the levee. This would provide protection from the 500-year frequency flood event. The other alternatives studied included flood plain evacuation, flood warning and forecasting, ring levees, and raising the existing levee with clay borrow to the riverward side.

1. We agree with your designation of the plan to obtain sand borrow from backwater areas and deposit such borrow on the landward side of the levee as the Environmental Quality Plan. Although implementation of the proposed action would lead to destruction of 47 acres of cropland, the remaining agricultural lands would be protected from inundation and subsequent erosion problems. Alternatively, the increased level of flood protection could result in more commercial and industrial development, leading to further conversion of agricultural land to non-farm uses. We would, therefore, suggest to local officials that the proposal be augmented by flood plain zoning which would regulate development and land use, and thereby minimize conversion of valuable agricultural land.

2. The DEIS refers to the potential mitigation of replacing the equivalence of 9 acres of wetlands, sloughs, and bottomland hardwoods which would be impacted. The Final EIS should include a commitment to a mitigation plan including such replacement or appropriate enhancement measures on project lands.

3. We have rated this project as Category LO-1, which means that EPA has only minor changes to suggest and that the Draft EIS adequately sets forth the environmental impacts of the proposed action and reasonably available alternatives. A notice of the availability of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on other agencies' projects.

Thank you for providing us the opportunity to review this Draft EIS. When the Final EIS is published, please forward three copies to this office. If you have any questions regarding our comments, please contact Arlene Kaganove, at 312/886-6696.

Sincerely yours,

Barbara Taylor Buckley

Barbara Taylor Buckley, Chief
Environmental Review Branch
Planning and Management Division

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Response to 14 May 1982 letter from
US Environmental Protection Agency, Region V.

1. Noted.

2. Mitigation for impacts to 4.5 acres of impacted wetland/slough habitat and reasons why the Rock Island District feels mitigation for impacts to 3-5 acres of bottom land hardwood habitat is not justified are discussed in paragraph 132 of the FEIS.

3. Noted.

Illinois Department of Conservation
life and land together

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CHICAGO OFFICE — ROOM 100 100 WEST RANDOLPH STREET
David Kenney, Director • James C. Helfrich, Assistant Director

May 17, 1982

Mr. Doyle W. McCully, P.E.
Chief, Engineering Division
Department of the Army
Rock Island District, Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

Re: NCRED-PJ

Dear Mr. McCully:

Thank you for your letters of 27 and 29 April, 1982 concerning the South Quincy Drainage and Levee District, Adams County, Illinois.

1. The Department has reviewed Interim Report No. 3 and the draft EIS for the above project. Our comments on these documents have been forwarded to the Illinois Department of Transportation, Division of Water Resources who has been designated the lead agency for the State of Illinois for this project. We have also provided our specific comments on the DEIS to the State Clearinghouse. You should be hearing from both of these agencies in the near future.

Thank you for the opportunity to comment.

Sincerely,

David Kenney

DK:RWL:alc

cc: State Clearinghouse
IDOT, DOWR

Response to 17 May 1982 letter from the Illinois Department of Conservation.

1. Noted.

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STATE OF ILLINOIS
EXECUTIVE OFFICE OF THE GOVERNOR
BUREAU OF THE BUDGET
SPRINGFIELD 62706

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
Feasibility Study for Flood Damage Reduction - South Quincy Drainage and Levee District
SAI #82 04 06 60

TO: Mr. Dovie W. McCully, P.E.
Chief, Engineering Division
Department of the Army
Rock Island District Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

1. The Illinois State Clearinghouse has reviewed the referenced subject pursuant to the National Environmental Policy Act of 1969, OMB Circular A-95, Revised and the administrative policy of the State. State agencies which are authorized to develop and enforce environmental standards have been given the opportunity to comment on this subject. Attached please find comments submitted by the Illinois Department of Agriculture.

Edward J. Wall, Jr.
Illinois State Clearinghouse

6/9/82
Date

Attachment

cc: Carolyn Sands

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Response to 19 May 1982 letter from the State of Illinois, Bureau of the Budget.

1. Noted.

ILLINOIS department of AGRICULTURE

Illinois State Fairgrounds, Springfield, Illinois 62706 1001
Phone (217) 782 6297

Division of Natural Resources

RECEIVED
MAY 1982
STATE CLEARINGHOUSE

May 17, 1982

Ms. Linda Impson
Illinois State Clearinghouse
Bureau of the Budget
605 Stratton Building
Springfield, Illinois 62706

Re: Feasibility Study for Flood Damage Reduction:
South Quincy Drainage and Levee District - Illinois

Dear Ms. Impson:

The feasibility study noted above has been reviewed to assess impact on farmland. It is our understanding that the selected plan recommends raising the existing 9.2 mile levee system 3.5 feet to increase protection of the district from a 50-year flood event to a 500-year flood event. About 55 acres of prime farmland would be required to make this improvement. We support the selected plan as described in the study.

1. Although about 55 acres will be converted to upgrade the levee, the bulk of which is identified as prime farmland by the study, we feel the proposal is acceptable. Of the 5,800 acres in the existing drainage and levee district, 3,800 are farmland. In this instance it is reasonable to utilize the smaller amount of farmland to protect several thousand acres currently in agricultural production. The existing levee was constructed specifically to protect agriculture and industry. Strengthening the system rather than building the ring levee discussed in the study which would protect only a small portion of the existing area, is the better choice.

Should there be questions about the above comments, please contact our office.

Sincerely yours,

Carolyn H. Sanda

Carolyn H. Sanda
Rural Resource Planner

CHS:mdg

cc: Adams County SWCD

Response to 17 May 1982 letter from the Illinois Department of Agriculture, Division of Natural Resources.

1. Noted. Recalculation of project impacts determined impacts to more accurately effect 47 acres of prime farmland, 4 acres of bottom land hardwoods, and 4.5 acres of wetland/slough type habitat.

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Illinois Department of Transportation
Division of Water Resources
2300 South Dirksen Parkway/Springfield, Illinois/62764

June 1, 1982

Col. Bernard P. Siefer
District Engineer
U.S. Army Corps of Engineers
Clock Tower Bldg.
Rock Island, Illinois 61201

Dear Col. Siefer:

We are coordinating state agency review of your Draft Feasibility Study for Flood Damage Reduction, South Quincy Drainage and Levee District. The Environmental Protection Agency and the Department of Agriculture had no comments on the study. The comments from the Department of Conservation are attached. I am sure you will address their concerns when planning progresses to the General Design Memorandum phase. 1

Our Northern Project Managers have worked with your staff for several years during the formulation of the recommended plan which will help to satisfy the social, political, environmental, and economic goals of the area.

We would like to see this study pushed expeditiously to the implementation stage, and are ready to assist in any way we can.

Sincerely,

Frank Kudrna
Director

Attachment
cc: Dick Lutz
Marvin Hubbell
Al Keller
Linda Impson

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Response to 1 June 1982 letter from the Illinois Department of Transportation Division of Water Resources.

1. Noted.

Illinois Department of Conservation
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RECEIVED

MEMO

TO: Frank Kudrna

FROM: David Kenney DK

DATE: May 17, 1982

SUBJECT: South Quincy Drainage and Levee District Feasibility Study, Interim Report No. 3

The Department has completed its review of the above feasibility report as requested in your memo of April 28, 1982.

We are pleased to note the planning constraints used in the study, and cited on page 4 of the report, include protection of wetlands, minimizing project effects on flood plains, other environmental features and the use of mitigation where applicable.

Based on the assumption that non-structural alternatives, the "no additional federal action alternative" and the Ring Levee alternative do not meet planning objectives as set forth by the project sponsors or the State of Illinois and therefore are no longer viable alternatives, the Department comments will center primarily on the selected plan components as described in Section 3 of the report.

1. In the report and in letters received by this Department from the Corps, it is reported that landward expansion of the levee base will require about 55 acres for additional levee right-of-way. On page 12 of the report it is stated "The land" (needed for right-of-way) "is presently used for production of corn and beans." In the Corps letter of April 29, 1982 and in the draft EIS, we get the impression that this landward expansion will impact 8 acres of wetlands, sloughs, and bottomland hardwoods considered valuable as a fish and wildlife resource. This discrepancy needs to be clarified.

2. In the section on Plan Accomplishments, page 13 it is stated "The plan also provides an opportunity for enhancement of the fisheries habitat in the Mississippi River backwater sloughs by dredging for levee fill materials". While we do not disagree with this statement, we wish to point out that there also will be impacts associated with this dredging. In our opinion, these impacts and enhancement opportunities need to be more fully discussed in future reports for the proposed dredging locations so that final dredging locations can be selected in an environmentally sound and objective a manner as possible.

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Response to 17 May 1982 letter from the Illinois Department of Conservation.

1. The text on page 12 has been modified accordingly.

2. Noted. Borrow areas are discussed further in paragraphs 121, 122, and 123 of the FEIS.

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While we realize interest rates (7 5/8 percent) used in the economic analysis of the proposal are consistent with current federal guidelines, they are "unrealistic" from every other viewpoint.

3. In the environmental section on page 15 (paragraph 2) it is stated, "In general, its" (the selected plan) "only effect will be to continue any impacts brought about by the existing levee". True, the existing levee, when constructed, caused impacts to the area's resources. The raise will also cause distinct new impacts. We do not understand how these impacts are a "continuation" of what already occurred many years ago. In fact, because of the impacts caused many years ago, these new impacts may be more critical to the resources of the area due to the limited amount of habitat remaining in the district.

4. Paragraph 2, page 15 again discusses the 55 acres of land required for rights-of-way and indicates 8 acres are in "natural or seminatural conditions". This, as previously mentioned, conflicts with page 12, paragraph b.

5. In the discussion of Executive Order 11988 on page 15 of the plan, it is stated "only 4 percent of that growth" (flood plain development) "can be attributed to location of new commercial/industrial facilities resulting from an increased level of flood protection". The report should clarify where that 4 percent is likely to occur and objectively identify the impacts to the natural resource base that will occur as a result of this projected growth.

6. It is stated in the discussion of Federal Responsibilities on page 17 "specific policies applicable for the South Quincy Drainage and Levee District project have not yet been established and it is also stated, "non Federal interests can expect--- the level of this financial participation will need to be significantly greater than in the past. How then, can estimated first costs and annual charges for Non-federal interests be identified in Table 1 and 7, page 14? Do these costs reflect the higher level described on page 17? If not they could be misleading to the local sponsor.

7. There was no discussion of mitigation in the report in the sections dealing with impacts although it is identified as a planning constraint on page 4. Future reports should specifically identify mitigation options and selections.

As requested in your April 28 memo, our comments on the Draft EIS will be sent directly to the State Clearinghouse.

UK:BWL:alc

cc: Marvin Hubbell, Dept. of Agriculture
Al Keller, Illinois EPA
USFWS, Rock Island

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3. The sentence has been reworded.

4. The text on page 15 has been modified accordingly.

5. The 4 percent growth is likely to occur in the northeast sector of the drainage district. The land surroundingly the industrial commercial enclave is primarily agricultural.

6. Yes. No policy has been approved.

7. Mitigation is discussed in paragraphs 130 and 132 of the FEIS.

STATE OF ILLINOIS
EXECUTIVE OFFICE OF THE GOVERNOR
BUREAU OF THE BUDGET
SPRINGFIELD 62706

Response to 7 June 1982 letter from the State of Illinois, Bureau of the Budget.

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT
Feasibility Study for Flood Damage Reduction- South Quincy Drainage and Levee District
SAI #82 04 06 60

TO: Mr. Doyle W. McCully, P.E.
Chief, Engineering Division
Department of the Army
Rock Island District Corps of Engineers
Clock Tower Building
Rock Island, Illinois 61201

1. Additional information has been received from the Department of Conservation regarding the impact of this project. A copy is attached for your information.

1. Noted.

Edward J. Lutkevich
Illinois State Clearinghouse

6/21/82
Date

Attachment

cc: Dick Lutz
Department of Conservation

169

169

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Illinois Department of Conservation
We are and together

605 A.W. C. STRATTON BUILDING • 600 SOUTH SPRING STREET • SPRINGFIELD 62706
CHICAGO OFFICE - ROOM 100 160 NO. LASALLE 60601
Dan Kennedy, Director • James C. Hall, Assistant Director

MEMO

TO: Edward J. Welk

FROM: David Kenney DK

DATE: May 17, 1982

SUBJECT: South Quincy Drainage and Levee District Feasibility Report, Project #82 04 06 80

As requested by the Illinois Department of Transportation, Division of Water Resources, who has assumed lead agency status for this project, the Department has reviewed the above report and accompanying draft EIS. Our comments on the report proper have been forwarded to the lead agency, our comments on the DEIS follow:

Summary, DEIS, paragraph 1

1. The Corps has designated the plan for raising the existing levees with expansion of the levee base to the landward side as the E. plan because of a potential mitigation plan to enhance backwater areas through dredging. In our opinion this DEIS does not provide the specific, objective data necessary to support that designation. It is possible when more detailed studies have been completed this designation may be warranted.

Summary, DEIS, paragraph 3

2. In addition to p rsuing mitigation through the U.S. Fish and Wildlife Service we would request the Illinois Department of Conservation also be consulted.

Summary, DEIS, paragraph 1

3. We do not consider the lack of resolution over the question of the displacement of 8 acres of wetlands, sloughs and bottomland hardwoods a minor issue.

Planning Objectives (8), EIS-2

4. We would suggest that a statement be added to the objective which indicates the flood reduction program must also be acceptable from an environmental, economic and social basis.

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Response to letter dated 17 May 1982 from the Illinois Department of Conservation.

1. Mitigation considered justified for project impacts is discussed in paragraphs 130 and 132 of the FEIS. With this mitigation net environmental benefits can be achieved through hydraulic dredging of Mississippi River backwater areas with dredged material being used to expand the maintain levee to the landward side. Expansion of the levee base to the landward side is thus designated the EQ Plan. Selection of this alternative as the EQ Plan is discussed under paragraph 55 of the FEIS.

2. It was assumed that the Illinois Department of Conservation was familiar with the current phase of planning for the project and was having dialogue with the US Fish and Wildlife Service because members of the Department are furnished copies of the US Fish and Wildlife Service Draft Coordination Act Report. In addition, comments were requested from the Illinois Department of Conservation in the two letters displayed on the following two pages, dated 27 and 29 April 1982. Any comments the Illinois Department of Conservation would contribute concerning mitigation would be appreciated.

3. This reference has been deleted.

4. The minimization of environmental and social impacts, the identification of positive environmental and social benefits, and cost justification are integral parts of the Federal planning process. To reiterate this under "Planning Objectives" seems redundant.

57-912 O - 86 - 7

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VANDERJACK/pls/6344

MCRED-PS 29 APR 1982

Dr. David Penney, Director
Illinois Department of Conservation
ATTN: Fish and Wildlife Resources
605 Stratton Office Building
Springfield, Illinois 62706

Dear Dr. Penney:

The US Army Corps of Engineers, Rock Island District, is considering a flood damage reduction project for the South Quincy Drainage and Levee District, Adams County, Illinois. The drainage district lies immediately south of Quincy, Illinois, on the Mississippi River and encompasses about 9,930 acres of primarily agricultural land. The study area is shown on the drawing attached as Inclosure 1.

The alternative for flood damage reduction being considered is to raise the existing levee. Raising the main stem levees along the Mississippi River would be accomplished by expanding the levee base to the landward side. Texas Chute on Ward Island and a backwater area near the mouth of Mill Creek at the south end of the main stem levee are being considered as hydraulic borrow sites. Raising the flank levee along Mill Creek would be accomplished with clay borrow obtained from areas along Mill Creek. For the lower 5,000 feet of this reach (Station 401+00 to Station 451+00), expansion of the levee base is being considered for the creek side of the levee, and for the upper 1,400 feet (Station 451+00 to Station 474+00), expansion would consist of a road raise and a short section of levee tying into high ground near Highway 57. The levee and the proposed borrow sites are indicated on Inclosure 1. The flank levee along Curtis Creek would be raised with clay borrow, but would also be raised about half its length with concrete walls.

Expansion of the levee base will require about 55 acres. The greatest portion of this expansion would be into pasture and cropland. At one point in the central part of the drainage district and at another in the southwest part of the district, the landward expansion of the levee will encroach upon forested and wetland areas. This encroachment would amount to about 6 acres considered valuable as a fish and wildlife resource. These impacts are unavoidable, and riverward expansion of the levee base would have greater impacts to natural resources. Along Curtis Creek at the north end of the levee district, modifications to existing concrete floodwalls will require the placement of floodwall footing into the waters of Curtis Creek for about 1,000 feet. Compared to its

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MCRED-PS
Dr. David Penney 29 APR 1982

upstream areas, Curtis Creek in this section is relatively deep, slower flowing, has poorer water quality, a softer bottom, a lower species diversity, and the biotic community were tolerant of disturbed or degraded conditions.

At the upstream end of the flank levee along Curtis Creek, about 1,000 feet of new concrete floodwall would be constructed. This new construction would be set back far enough out to encroach upon the creek. The terrestrial impacts would not be significant. Along Mill Creek at the south end of the levee district, expansion of the levee base would affect about 8 acres on the creek side, and about 2 acres on the landward side of the levee. The creek side of the levee is a good quality natural resource and provides water, wetland, and wooded areas for fish and wildlife. Landward of the levee is prime farmland.

Obtaining hydraulic borrow from Texas Chute on Ward Island will have initial adverse impacts, but will improve the resource over the long term by decreasing the water with consequent improvements in water quality. Obtaining dry land borrow from areas along Mill Creek would affect approximately 18 acres of the Mill Creek flood plain. The immediate effects would be the loss of flood plain vegetation with sedimentation and turbidity impacts to Mill Creek from overland runoff. These effects will be temporary; after borrow activities have ceased and vegetation occurs, the area may have improved fish and wildlife value. If the elevation is low enough, the area could become a small marsh which could support a diverse assemblage of aquatic and semiaquatic fauna. If the elevation is too high for the area to become a marsh, it would pass through successional stages until it becomes flood plain forest again. The successional stages of a disturbed area will often provide more food and cover value for wildlife than the stable climax stage it eventually becomes.

No significant impacts to any Illinois listed endangered species are anticipated as a result of the project. This determination is being coordinated with the Division of Planning and Design, Impact Analysis Section.

We would appreciate any comments you would care to make concerning this project. If you have any questions, please contact Bob Vanderjack of our Environmental Analysis Section, 309/788-6361, Ext. 6344.

Sincerely,

1 Incl
As stated

BOYLE W. McCELLY, P.E.
Chief, Engineering Division

CF:
Dist File (ED-PS)
ED
ED-PS
ED-PS-PP
✓ ED-PS-EA

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VANDERJACK/pla/6344

NCRED-PB

27 APR 1982

Mr. David Kenney, Director
Illinois Department of Conservation
ATTN: Division of Planning and
Design, Impact Analysis Section
(Endangered Species)
605 Stratton Office Building
Springfield, Illinois 62706

Dear Mr. Kenney:

The US Army Corps of Engineers, Rock Island District, is considering a flood damage reduction project for the South Quincy Drainage and Levee District, Adams County, Illinois. The drainage district lies immediately south of Quincy, Illinois, on the Mississippi River, and encompasses about 5,[illegible] acres of primarily agricultural land. The study area is shown on the drawing attached as Inclosure 1.

The alternative for flood damage reduction being considered is to raise the existing levee. Raising the main stem levee along the Mississippi River would be accomplished by expanding the levee base to the landward side. Texas Chute on Ware Island, and a backwater area near the mouth of Hill Creek at the south end of the main stem levee, are being considered as hydraulic borrow sites. Raising the flank levee along Hill Creek would be accomplished with clay borrow obtained from areas along Hill Creek. For the lower 5,[illegible] feet of this reach (Station 4[illegible] to Station 451+00), expansion of the levee base is being considered for the creek side of the levee, and for the upper 1,[illegible] feet (Station 451+00 to Station 449+00), expansion would consist of a road raise and a short section of levee tying into high ground near Highway 57. The levee and the proposed borrow sites are indicated on Inclosure 1. The flank levee along Curtis Creek would be raised with clay borrow, but would also be raised along about half its length with concrete walls.

A listing of endangered species for Adams County, Illinois, is attached as Inclosure 2. Eleven species are listed but, as indicated on Inclosure 2, only four species are reported as currently found in the county. From habitat descriptions, only one species seems to have the potential for being disturbed by the project. This is: Sedge (Carex prasina). This species is only reported to have been found in a State Park. The closest State Park is approximately 5 miles north of the project area. Therefore, no impact to any State of Illinois listed endangered species is anticipated.

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NCRED-PB
Mr. David Kenney

27 APR 1982

We would appreciate any comments you would care to make concerning this project. If you have any questions, please contact Bob Vanderjack of our Environmental Analysis Section, [illegible]-6341, Ext. 6344.

Sincerely,

2 Encl
As stated

DONALD W. McCULLY, P.E.
Chief, Engineering Division

CF:
Dist File (ED-PB)
ED
ED-PB
ED-PB-PF
✓ED-PB-PA

Raise Existing Levee (-5), EIS-9

5. Based on the information presently available to us we would concur that expansion of the mainstem levee to the landward side with sand borrow is considered less disruptive to the natural resources of the area than riverward expansion.

Raise Existing Levee (57), EIS-10

6. The criteria for identifying "wherever practical" should be stated.

Landward Expansion Section EIS 30-34

7. Since this alternative is the Corps' selected option, much greater attention needs to be devoted to describing the impacts of the various plan components on the area's natural resources. This part of the EIS should show very precisely and objectively the specific impacts that will result to the habitats and species which utilize these habitats, should the selected plan be implemented. Based on these impacts, specific measures to avoid, minimize or mitigate these impacts should also be clearly displayed. Specifically, we recommend that the following areas be addressed in more detail:

a. 1. Texas Chute and any other backwater considered as a dredging site for levee construction
b. 2. Mill Creek floodplain where material for levee construction would be removed
c. 3. The ponds, wetland and woodland areas that lie inside the levee and will succumb to clearing, draining and filling as increased flood protection promotes developmental attitudes within the district.

Borrow Areas (121), EIS-33

8. This paragraph attempts to justify the loss of 18 acres of Mill Creek flood plain and its associated "good quality fish and wildlife resources" by suggesting after borrow is taken from the site the area "may" have improved fish and wildlife values.

Until one precisely and objectively has determined species composition, engineering design, elevations, etc. and impacts associated with these components, statements such as are presented in this section are unfounded.

The Department appreciates the opportunity to present its viewpoints on this DEIS.

BK:RWL:alc

cc: USFWS, Rock Island
Frank Kudrna, DCNR

5. Noted.

6. During revision of FEIS this reference has been deleted.

7a & b. Further discussion of Texas Chute and the Mill Creek borrow areas can be found in paragraphs 121, 122, and 123 of the FEIS.

7c. Since 50-year flood protection already exists, the speculated clearing, drainage, and filling would probably occur with or without the project. Some of the areas may be too wet to farm and those along the existing levee probably rise and fall with river levels and could not be drained. General descriptions of these areas are given in the "Affected Environment " section of the FEIS and in the Draft and Final Fish and Wildlife Coordination Act Report, found in the Main Report. The clearing, draining, and filling of these resources would result in the loss of the resource.

8. This paragraph has been rewritten in the FEIS. Paragraphs 121, 122, and 123 of the FEIS address borrow areas.

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TABLE EIS-7

Index, References, and Appendixes

Subjects	Environmental Impact Statement	Main Report (References Incorporated)	Report Appendixes (References Incorporated)
Affected Environment	EIS-14		
Alternatives	EIS-2		
Borrow Areas	EIS-35		
Comments on DEIS (With Responses)	EIS-39		
Comparative Impacts of Alternatives (Table EIS-2)	EIS-12		
Cultural Resources	EIS-25		
Economic	EIS-26		
Economic Appendix of Interim 3 Report			B
Endangered Species	EIS-24		
Environmental Effects	EIS-27		
Fish and Wildlife Coordination Act Report			C
Illinois Water Quality Standards, General Water Uses	EIS-19		
Illinois Water Quality Standards, Secondary Contact and Indigenous Aquatic Life Standards	EIS-21		
Intent of Congress	EIS-1		
List of Preparers	EIS-36		
Location Map		Plate 1	
Natural Resources	EIS-14		
Planning Objectives	EIS-2		
Plans Considered in Detail	EIS-5		
Plans Eliminated from Further Study	EIS-2		
Public Concerns	EIS-1		
Public Involvement	EIS-36		
Results of Chemical Analysis of Water Samples (Table EIS-3)	EIS-18		
"Purpose of Authority" Section of Interim 3 Report		1	
Relationship to Environmental Protection Statutes and Other Environmental Requirements (Table EIS-1)	SUMMARY		
Social	EIS-26		
Study Authority	EIS-1		
Summary	PRECEDES EIS		
Summary of National and Illinois Ambient Air Quality Standards (Table EIS-6)	EIS-23		
Table of Contents	EIS-i		
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Table EIS-2 (Comparative Impacts of Alternatives)	EIS-13		
Table EIS-3 (Results of Chemical Analysis of Water Samples)	EIS-18		
Table EIS-4 (Illinois Water Quality Standards, General Water Uses)	EIS-19		
Table EIS-5 (Illinois Water Quality Standards, Secondary Contact and Indigenous Aquatic Life Standards)	EIS-21		
Table EIS-6 (Summary of National and Illinois Ambient Air Quality Standards)	EIS-23		

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CLEAN WATER ACT SECTION 404(b)(1)

EVALUATION

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DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT CORPS OF ENGINEERS
CLOCK TOWER BUILDING
ROCK ISLAND, ILLINOIS 61201

REPLY TO
ATTENTION OF:
NCRED-P

SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
QUINCY, ILLINOIS

FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

JUNE 1982

ATTACHMENT 1 OF 1

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SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
QUINCY, ILLINOIS

FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

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SOUTH QUINCY DRAINAGE AND LEVEE DISTRICT
QUINCY, ILLINOIS

FEASIBILITY STUDY FOR FLOOD DAMAGE REDUCTION

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

I - PROJECT DESCRIPTION

Location

The South Quincy Drainage and Levee District is located in the Mississippi River flood plain between river mile 318.5 and 325.5. It is bounded by the Mississippi River on the west, the river bluffs on the east, Curtis Creek on the north, and Mill Creek on the south. The drainage and levee district consists of approximately 5,800 acres, of which 3,800 acres are cropland, 165 acres industrial-commercial-residential, and 1,835 acres are in lakes, bottom land forest, and other uses. The industrial-commercial facilities are concentrated in the northeast portion of the district and have an estimated value in excess of $300 million. The wastewater treatment facility for the city of Quincy, Illinois, is located about 1 mile west of the industrial development. It is protected by a separate ring levee affording a 500-year level of protection. The project area is displayed on plate 2 of the main report.

General Description

The preferred plan for the reduction of flood damage within the drainage and levee district involves raising approximately 9.2 miles of existing levee and floodwalls approximately 3.5 feet. The mainstem Mississippi River levee would be raised with pervious material, and the flank levees along Curtis and Mill Creek would be raised with impervious material.

Four aspects of the preferred plan require the preparation of this Section 404 Evaluation:

a. Just downstream from the Highway 57 bridge along Curtis Creek at the north end of the levee system, about 0.2 mile of existing floodwall would be raised. This would require placing about 500 linear feet of concrete floodwall footing into Curtis Creek. Just upstream from the Highway 57 bridge, about 0.4 mile of new levee/floodwall construction and floodwall raising would occur which would result in about 300 linear feet of riprap. None of the riprap is anticipated to be placed below the ordinary high water mark.

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b. Approximately 1,230,400 cubic yards of pervious material would be extracted from Texas Chute and backwater areas near the mouth of Mill Creek to raise the existing levee.

c. Raising the height of the existing mainstem levee would result in an increase in its width. This increase in width would result in the loss of 4 acres of wetland/slough habitat.

d. Approximately 0.5 acre of wetland/slough type habitat along the Mill Creek flank levee at the south end of the District will be impacted by creekside expansion of the levee.

Authority and Purpose

On 11 December 1969, the Committee on Public Works of the House of Representatives passed a resolution to conduct studies to investigate the feasibility of improving levee systems along the Mississippi River from Coon Rapids Dam to the mouth of the Ohio River. The scope of the study was to evaluate alternative measures to reduce flood damages, and to enhance water and related land resources within the limited area encompassed by the study authority.

The results of this study indicate that Federal participation in improvements is warranted for the South Quincy Drainage and Levee District. Several alternative plans to reduce potential flood damages within the drainage and levee district were considered. The preferred alternative is raising the height of the existing levees within the district. This tentatively selected plan involves raising the existing line of protection approximately 3.5 feet (500-year level). The proposed project has a benefit-to-cost ratio of 5.3 to 1.0, based on a 100-year economic life and a discount rate of 7-5/8 percent.

General Description of Dredged or Fill Material

Approximately 1,230,000 cubic yards of pervious material would be hydraulically dredged from Texas Chute and backwater areas near the mouth of Mill Creek in order to raise the existing line of levee protection. The material to be extracted can be classified as river bottom sediment that is comprised of sand particles which are fine-to-medium in size. This material would be placed on the landward slopes of the levee flanking the Mississippi River. The material would increase the width of this approximately 6.2-mile reach of levee, an average of about 50 feet, and its height approximately 3.5 feet. Four acres of wetland/slough habitat would be impacted.

Along Curtis Creek, just downstream from the Highway 57 bridge, an existing 0.2-mile concrete floodwall would be raised an average of 6 feet. This would require placing about 500 linear feet of concrete floodwall footing into Curtis Creek. Just upstream from the Highway 57 bridge, about 0.4

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mile of new levee/floodwall construction and floodwall raising would occur which would result in about 300 linear feet of riprap. None of the riprap is anticipated to be placed below the ordinary high water mark. The concrete and riprap will be chemically and physically stable, and noncontaminating.

Along Mill Creek at the south end of the District, a long, narrow, low area at the base of the existing levee would be impacted by creekside expansion of the levee base. The low area has been identified as a wetland. About 0.5 acre of wetland will be impacted. The fill material will be impervious borrow deemed suitable for levee construction.

Description of the Proposed Discharge Sites

The improvement to the existing 0.2 mile of floodwall along Curtis Creek located just downstream from the Highway 57 bridge will involve placing the footing of a concrete floodwall into a 500-foot-long section of the creek. The creek in this area is changing from a shallow, bedrock substrate to a deeper, soft-bottom channel with slower flow. The soft substrate is an unstable environment and does not support a diverse benthic macroinvertebrate fauna. The low benthic diversity can also be attributed to poor water quality as well as the combination of low flow and greater mean depth. The combination of a low flow and greater mean depth has the potential for creating dissolved oxygen deficits during times of high temperature. This potential condition would result in the elimination of species which are not tolerant of anaerobic conditions. The low oxygen condition could be aggravated by a temporary increase of suspended particulate matter resulting from construction activity. The impacts would be temporary; they would not disturb a high quality area; and impacted species would reestablish in a relatively short time after construction has ceased.

Upstream from the Highway 57 bridge along Curtis Creek, about 0.4-mile of new levee/floodwall construction, floodwall modification, and about 300 linear feet of riprapping are being considered. The creek here is in a transition zone between the poorer quality of the lower stream reaches and the better quality of the upper reaches. Construction and riprapping are not anticipated to occur below the ordinary high water mark.

Approximately 1,230,400 cubic yards of pervious material extracted from Texas Chute and backwater areas near the mouth of Mill Creek would be deposited on the landward side of the main levee which runs parallel to the Mississippi River. As a result, the levee would be extended an average of 3.5 feet in height and 50 feet in width along the 6.2-mile structure. This expansion would require approximately 50 acres of land, most of which is presently used as farmland. About 4 acres of the expansion will impact wetland/slough type habitat. Many of the surface water areas within the levee system are surrounded by natural vegetation and are

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scattered islands within the predominantly agricultural area. The forested wetland areas support a diverse assemblage of wildlife. The inland lakes and sloughs have experienced siltation effects, but do provide recreational fishing benefits.

Texas Chute is a backwater area of the Mississippi River running along the east side of Ward Island at the western edge of the study area. Texas Chute is about 2.3 miles long and about 300-500 feet wide. Ward Island is heavily wooded. Texas Chute was one of the backwater areas specified by the GREAT II Side Channel Work Group which could benefit from deepening its waters.

The low wetlands/slough area along the Mill Creek flank levee which will be impacted by the creekside expansion of the existing levee is about 1,000 feet long, 80 feet wide, and 1-3/4 acres in area. The regular shape of the area lying at the base of the existing levee indicates it was probably created during construction of the existing levee. About 0.5 acre of the wetland/slough type habitat will be impacted.

Description of Disposal Method

The riprap and concrete that would be used in raising the existing level of protection along Curtis Creek in the vicinity of the Highway 57 bridge would be brought to the discharge site by truck. The riprap and concrete would be discharged by mechanical means.

The dredging in Texas Chute and backwater areas near the mouth of Mill Creek to obtain pervious material for raising the existing levee would be accomplished hydraulically. This material would be worked on the landward side of the levee by mechanical methods.

Obtaining borrow and deposition on the flank levee along Mill Creek would be mechanical.

II - FACTUAL DETERMINATION

Physical Substrate Determination

The present river bottom elevation of Texas Chute is approximately 458 feet MSL. The 460-foot elevation is the approximate pool level maintained by Lock and Dam 22, located at Saverton, Missouri.

When the navigation locks and dams were constructed, the Mississippi River changed from a free-flowing to a step-gradient river. As a result, the side channels and backwaters of the river now experience more sedimentation than when the river was free-flowing.

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Texas Chute has relatively slow moving, shallow water and a substratum composed of sand and silt. Dredging operations would severly impact the benthic community. The benthic community has been determined to be of poor quality. Over the long term, the deeper water will improve water quality and improve the fishery. The chute may also have improved feeding and resting quality for waterfowl.

The present streambed elevation of Curtis Creek in the vicinity of the Highway 57 bridge is approximately 470 to 475 feet MSL. Between the Highway 57 bridge and its mouth, the creek becomes relatively deep, has slow moving water, and a substratum of sand, silt, and clay. The benthic community becomes lower in diversity and hindered by poor water quality. Approximately 500 feet of floodwall construction just downstream from the Highway 57 bridge would require a concrete footing to be placed in the streambed. The construction activities necessary could temporarily increase levels of suspended particulate matter. This impact would be temporary and would not be impacting a high quality aquatic resource.

Water Circulation, Fluctuation, and Salinity Determination

The backwater area near the mouth of Mill Creek is at the downstream end of an open backwater with a closure dam at its inlet. Being at the downstream end of a river island where a delta might form from Mill Creek, could result in sedimentation impacts to the area. Sedimentation though would not be as severe as in Texas Chute and water quality and diversity of aquatic life would be better than in the Texas Chute.

Recent water quality data for a non-main channel area in the vicinity of Quincy was collected in 1979. The sampling area is located approximately 6 miles upstream from Texas Chute in Quincy Bay. This data may be indicative of water quality conditions in Texas Chute. Water quality sampling was done in the bay prior to maintenance dredging to determine the pollutional effects of dredging.

Background field measurements as well as sediment and water quality samples in Quincy Bay were taken on 1 May 1979. The samples were delivered to the Iowa State Hygienic Laboratory in Des Moines, and analyzed for the following parameters: Chemical oxygen demand, biochemical oxygen demand, nitrogen, ortho and total phosphate, metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, manganese, and iron), oil and grease, solids (total, fixed, and volatile), pesticides (endrin, lindane, dieldrin, methoxychlor, toxaphene, 2,4-D,and 2,4,5-TP), and polychlorinated biphenyls. These parameters were assayed for in the ambient, supernatant elutriate, and filtered elutriate samples. The results are shown in table 1.

The results indicate that concentrations of iron, nitrate, ammonia, phenols, oil and grease, and filterable residue contained in the samples exceeded US EPA water quality criteria. Analysis of the data provides an indication of potential water quality problems when applying this data to Texas Chute

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TABLE 1

Water Quality Data*
Quincy, Illinois - Mississippi River
Quincy Bay Access Channel

Parameter	Ambient	Supernatant Elutriate	Filtered Elutriate
Organic Nitrogen	0.80	1.7	1.2
Ammonia Nitrogen	0.13	4.9	4.8
Nitrate Nitrogen	11	6.7	6.2
Total Residue	363	382	-
Fixed Residue	231	252	-
Volatile Residue	131	130	-
Total Filterable Residue	265	354	-
Fixed Filterable Residue	154	192	-
Volatile Filterable Residue	111	162	-
Total Nonfilterable Residue	88	33	296
Fixed Nonfilterable Residue	76	28	222
Volatile Nonfilterable Residue	12	5	74
Filterable Phosphate	0.05	0.02	0.02
Total Phosphate	0.05	0.10	0.04
Seeded BOD	4	-	10
BOD	-	11	-
COD	33	39	3.5
Grease or Oil	3.5	3.4	3.8
Conductance	-	-	-
Dissolved Oxygen	-	-	-
Water Temperature	12°	-	-
pH	7.85	-	-
Phenol	1.8 u/l	6.6 u/l	6.2 u/l
Floride	-	-	-
Ca CO_3	-	-	-
Ca	-	-	-
Mg	-	-	-
So_4	-	-	-
Arsenic	<0.01	<0.01	<0.01
Barium	-	-	-
Cadmium	<0.001	<0.001	<0.001
Chromium Total	<0.01	<0.01	<0.01
Chromium Hexavalent	-	-	-
Copper	<0.01	0.02	<0.01
Lead	<0.01	0.02	<0.01
Mercury	<0.001	<0.001	<0.001
Nickel	<0.1	0.1	<0.1
Selenium	-	-	-
Silver	-	-	-
Iron	0.01	1.4	<0.01
Magnesium	19	20	20
Zinc	0.35	0.06	0.54
Fecal Coliforms	-	-	-

* All parameters are reported in mg/l unless otherwise specified.

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unless measures are taken to allow suspended solids to settle when dredge materials are deposited. Filterable residue is the only parameter which might still exceed the criteria after solids have settled. Table 1 shows iron was high in the supernatant elutriate sample, but not in the other samples. This is indicative that iron is adsorbed to suspended solids but would not be a water quality problem if a containment area could be used to allow suspended solids to settle. The results show the nitrate level slightly exceeded the criteria in the ambient water sample. Since the supernatant and filtered elutriate levels were less than the ambient levels, the results indicate that nitrates are being adsorbed to suspended sediments. The ammonia level in the ambient sample exceeds EPA recommended levels. The supernatant and filtered samples were not different, indicating that most of the ammonia is in solution and not adsorbed to suspended sediments. Phenol levels of the ambient, supernatant elutriate, and filtered elutriate samples each exceeded recommended EPA criteria for domestic water supplies. The supernatant elutriate level exceeded the filtered elutriate level, indicating adsorption to suspended sediments, and the lower filtered elutriate level also indicates the phenols exist in solution. In regard to oil and grease, all three sample levels approximated each other, indicating no significant amount liberated from the sediments. Lastly, the filtrable residue in the ambient sample exceeded EPA limits, but after removing the ambient total from the supernatant and filtered elutriate total, the level did not exceed the recommended criteria.

The test results indicate organic nitrogen, ammonia, nonfilterable residue, seeded BOD, and phenol parameters as having higher elutriate than ambient concentrations. However, considering that the elutriate tests simulate the worst possible conditions and may overstate impacts, and that the Mississippi River flow would quickly dilute and disperse liberated species, it is anticipated that there would be no adverse water quality impacts to aquatic species or wildlife due to hydraulic dredging and disposal.

Since both Quincy Bay and Texas Chute are sedimented, non-main channel areas, it is felt that many of the same water quality problems previously discussed will be encountered at the Texas Chute area. It is surmised that increased levels of suspended solids from the proposed action of the dredge cutterhead and return flows from disposal sites would generally subside to background levels within a mile below the dredge site and would be confined to a relatively narrow plume. Pollutant concentrations (heavy metals, nutrients, and coliforms) generally are strongly correlated with suspended sediments and subside to background levels at about the same rate as do suspended sediments. Dissolved solids in any return water from disposal would be sufficiently diluted in a mixing zone of reasonable size and would pose no threat to the quality of the receiving water. If dredged material were retained in a diked disposal area which would be a standard construction practice when depositing hydraulic borrow on a levee, no serious water pollution would be anticipated.

Water quality of the Mississippi River is moderate-to-good and typically carries a high suspended solids content. Water quality in the upstream areas of Curtis Creek along the north border of the study area is good, but worsens downstream near the mouth of the creek. Along Mill Creek at the

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south end of the district, water quality is typical of a rural stream with only fecal coliform counts being higher than expected. Within the area protected by the levee, water quality conditions at the South Quincy pumping station could typify the district because it is a collection and discharge point for interior drainage. Three water quality parameters at the pumping station indicated poor water quality and probably reflected the stagnant water conditions at the pumping station and the agricultural nature of the drainage district. Results of water quality analyses for five locations in the vicinity of the study area are presented in table 2. Water quality standards of the State of Illinois for "General Use Waters" and "Secondary Contact and Indigenous Aquatic Life" waters are shown in tables 3 and 4.

When the water quality data given in table 1 is compared with the State of Illinois standards for "General Use Waters" (table 3), and standards for "Secondary Contact and indigenous Aquatic Life" waters (table 4) under the assumption that the table 1 data is indicative of conditions in Texas Chute, no violations of these standards from the dredging of Texas Chute would be anticipated.

Water Quality data for Curtis Creek is given in table 2. When the addition to the existing floodwall is being constructed, there is the concern of temporary increased turbidity. The waterflow would be diverted in the creek bed in order to increase the size of the wall and strengthen its foundation. This action will tend to reduce the amount of turbidity that could occur. The amount of turbidity would be moderate and result in only minor adverse impacts upon the aquatic environment of this portion of Curtis Creek. The quality of the aquatic environment in this portion of the creek has been reduced by industrial and urban influences in the immediate area.

Water quality in Mississippi River backwater areas near the mouth of Mill Creek could be expected to be intermediate between Texas Chute and the main channel of the Mississippi River since flows and sedimentation impacts are anticipated to be intermediate between the two. The effects of Mill Creek in these backwaters would be moderate. Data for Mill Creek given in table 2 indicate fecal coliform counts to be the only measured parameter which seemed excessive. The high fecal coliform count is probably a reflection of the rural nature of the creek's watershed.

Current Patterns and Circulation

Texas Chute is located in Pool 22 to the east of Ward Island. Its inlet is located off of the main channel at approximately river mile 323.5, and its outlet is off of the main channel at approximately river mile 321.2. The inlet is approximately 1 mile below Lock and Dam 21. The Mississippi River is a flowing water, and Texas Chute could be classified as a slack water area. Quincy Bay, which was referenced in the previous discussion, could also be classified as a slack water area.

The result of the waterflow patterns is that bedloads from the Mississippi River are deposited at the inlet of Texas Chute and the entrance to Quincy

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TABLE 2

Results of Chemical Analyses of Water Samples Collected From the Vicinity Of South Quincy Drainage and Levee District, Illinois, Study Area, 6 October 1980

	Parameter											
	Biochemical Oxygen Demand (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Orthophosphate-Phosphorus (mg/l)	Soluble Orthophosphate-Phosphorus (mg/l)	Fecal Coliform Bacteria (MPN)	Total Alk. (mg/l as $CaCO_3$)	Turb. (JTU)	Depth[a] (ft)	Temp. (C)	pH	DO[b] (mg/l)	Cond. (umhos @25 C)
Curtis Creek Upper	1.6	0.9	0.003	<0.003	90	169.0	9.9	1	14.66	7.99	5.75	416
Curtis Creek Mouth	3.0	2.8	0.011	0.009	2,400	141.0	29	2.5	15.46	8.12	5.75	341
Mill Creek	1.6	0.3	0.003	<0.003	430	173.0	4.0	1	14.80	7.90	5.79	320
South Quincy Pumping Station	7.4	1.2	0.038	0.048	<30	189.0	32	0.5	16.59	8.13	5.69	370
Mississippi River Quincy, Illinois	1.1	<0.1	1.963	1.900	<30	112.0	67	2	15.74	8.18	5.80	307

(a) Depth from which samples were taken.

(b) Erroneous reading for 6 October 1980 samplings due to probe malfunction.

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TABLE 1

Illinois Water Quality Standards
General Water Uses

General Water Uses. All waters except those designated as Secondary Contact and Indigenous Aquatic Life Waters.

General Standards (parameters)

pH	6.5 - 9.0, except for natural causes
Phosphorus	0.05 mg/l
Dissolved oxygen	Not to drop below 6.0 mg/l at least 16 hours of any period, nor less than 5.0 mg/l at any time
Fecal coliforms	Geometric mean not to exceed 200/100 ml based on minimum of 5 samples taken over 30-day period, nor shall more than 10% of the samples during any 30-day period exceed 400/100 ml
Toxic substances	None shall exceed 1/10 of 96-hour median tolerance limit for native fish or essential fish food organisms except for certain USEPA registered pesticides
Temperature	Not more than 5°F above natural temperatures; not over 60°F for January through March, and December; not over 90°F April through November

Chemical Parameters:

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Ammonia Nitrogen (as N)	00610	1.5
Arsenic (total)	01002	1.0
Barium (total)	01007	5.0
Boron (total)	01022	1.0
Cadmium (total)	01027	0.05
Chloride	00940	500.0
Chromium (total hexavalent)	01032	0.05
Chromium (total trivalent)	01033	1.0
Copper (total)	01042	0.02
Cyanide	00720	0.025
Fluoride	00951	1.4
Iron (total)	01045	1.0

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TABLE 3 (Cont'd)

Chemical Parameters: (Cont'd)

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Lead (total)	01051	0.1
Manganese (total)	01055	1.0
Mercury (total)	71900	0.0005
Nickel (total)	01067	1.0
Phenols	32730	0.1
Selenium (total)	01147	1.0
Silver (total)	01077	0.005
Sulfate	00945	500.0
Total Dissolved Solids	70300	1,000.0
Zinc	01092	1.0

Source: Illinois Pollution Control Board. Adopted 1972. Rules and regulations, chapter 3, water pollution, amended May 24, 1979. The Bureau of National Affairs, Inc., Washington, DC.

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TABLE 4

Illinois Water Quality Standards
Secondary Contact and Indigenous Aquatic Life Standards

Secondary Contact and Indigenous Aquatic Life Waters. Not suitable for general use but can be used for "all secondary contact uses and which will be capable of supporting an indigenous aquatic life limited only by the physical configuration of the body of water, characteristics and origin of the water, and the presence of contaminants in amounts that do not exceed the Rule 205 water quality standards" (Rock River not included).

Secondary Contact and Indigenous Aquatic Life Standards

pH	6.0 - 9.0 except for natural causes
Dissolved Oxygen	Not less than 3.0 mg/l for at least 16 hours in any 24-hour period or less than 4.0 mg/l at any time
Fecal coliform	Based on minimum of 5 samples taken over not more than 30-day period not to exceed geometric mean of 1,000/100 ml nor shall be more than 10% of the samples during any 30-day period exceed 2,000/100 ml
Temperature	Not to exceed 93°F more than 5% of the time or 100°F at any time
Cyanide	Not to exceed 0.10 mg/l
Any substance listed in Rule 205(c) to aquatic life	Not to exceed one-half of 96 hour median tolerance limit for native fish or fish food organisms

Chemical Parameters:

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Ammonia Nitrogen (as N)	00610	2.5 (Apr-Oct) 4.0 (Nov-Mar)
Arsenic (total)	01002	1.0
Barium (total)	01007	5.0
Cadmium (total)	01027	0.15
Chromium (total hexavalent)	01032	0.3
Chromium (total trivalent)	01033	1.0
Copper (total)	01042	1.0
Cyanide (total)	00720	0.10
Fluoride (total)	00951	15.0

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TABLE 4 (Cont'd)

Chemical Parameters: (Cont'd)

CONSTITUENT	STORET NUMBER	CONCENTRATION (mg/l)
Iron (total)	01045	2.0
Iron (dissolved)	01046	0.5
Lead (total)	01051	0.1
Manganese (total)	01055	1.0
Mercury (total)	71900	0.0005
Nickel (total)	01067	1.0
Oils, fats and greases	00550, 00556 or 00560	15.0 *
Phenols	32730	0.3
Selenium (total)	01147	1.0
Silver	01077	0.1
Zinc (total)	01092	1.0
Total Dissolved Solids	70300	1,500.

* Oil shall be analytically separated into polar and non-polar components if the total concentration exceeds 15 mg/l. In no case shall either of the components exceed 15 mg/l (i.e., 15 mg/l polar materials and 15 mg/l non-polar materials).

Source: Illinois Pollution Control Board. Adopted 1972. Rules and regulations, chapter 3, water pollution, amended May 24, 1979. The Bureau of National Affairs, Inc., Washington, DC.

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Bay. Suspended sediment loads are deposited further into Texas Chute during periods of high water due to reduced water velocities. Over a period of years, water depths in Texas Chute have been reduced and the quality of the aquatic habitat has deteriorated.

Curtis Creek is a flowing water. The upper half of the creek has a rapid current. The lower portion of the creek has a flatter profile, is deeper, and the substratum is composed of small sand, silt, and clay particles. These changes from the upper to the lower half of the creek result in a reduction of velocity. As a result, suspended sediments are deposited in the lower reaches of the creek.

Backwater areas near the mouth of the Mill Creek are at the downstream end of an open backwater channel with a closure dam at its inlet. The area probably is a flowing backwater during high Mississippi River stages and when discharges from Mill Creek are high, and more of a standing water area when river and creek stages are low.

Normal Water Level Fluctuations

Pool 22 of the Mississippi River is regulated to maintain a flat pool elevation of 459.5 feet MSL for navigation purposes. Large fluctuations are infrequent, but can result from an abundance of rain and/or snowmelt. Curtis Creek empties into Pool 21 of the Mississippi River approximately one-half mile above Lock and Dam 21. Pool 21 of the Mississippi is regulated to maintain a flat pool elevation of 470 feet NGVD. Maintaining a flat pool level of 470 feet MSL in Pool 21 does not effect normal water level fluctuations in Curtis Creek. Normal water level fluctuations within the creek are the result of events within the Curtis Creek watershed.

Salinity Gradients

The proposed project would involve an inland freshwater system. Salinity gradients, therefore, do not apply to the proposal, and are not a concern.

Actions to Minimize Impacts

Expansion of the mainstem levee base to the landward side produces fewer impacts to natural resources than expansion of the levee base to the river-side.

Texas Chute was selected as a hydraulic borrow site because it was one of the backwater areas specified by the GREAT II Side Channel Work Group which could benefit from deepening its water.

Diking of deposition areas would minimize runoff impacts when hydraulic borrow is deposited. This is a standard construction practice.

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Concrete and riprap to be used along Curtis Creek in the vicinity of the Highway 57 bridge will be chemically and physically stable, and noncontaminating.

Suspended Particulate/Turbidity Determinations

Dredging, placement of dredge material, and improvements in the existing floodwall, would produce increases in suspended particulate matter and turbidity. These effects would be temporary and, except for wetland/slough impacts, would occur in waters which already are turbid and carry a heavy suspended load. Wetland/slough habitats which would be impacted have already experienced sedimentation impacts.

In May of 1979, water and sediment samples were collected in the Quincy Bay area of the Mississippi River, approximately 6 miles upstream from Texas Chute. The areas are somewhat similar with regard to their hydrology. The findings of the Quincy Bay analyses may be indicative of events in Texas Chute. The samples were analyzed by the Iowa State Hygienic Laboratory in Des Moines, Iowa. (Refer to table 1 for test results.) Ambient water quality is anticipated to be better and water quality dredging impacts are anticipated to be less severe in Mississippi River backwater areas near the mouth of Mill Creek than water quality and dredging impacts in Texas Chute.

Ambient, unfiltered, and filtered measurements were made to establish a framework against which the effects of dredging and disposal operations could be compared. The effects of dredging and disposal are simulated by mixing sediments proposed for dredging in the ambient water, allowing the sediments to settle, and then to analyze the effect on the ambient water.

The parameters from the Quincy Bay analyses which seemed to be affected to a significant degree were primarily associated with or adsorbed to suspended matter (see discussion under "Water Circulation, Fluctuation, and Salinity Determination"). No serious water quality problems would be anticipated if containment methods were employed to allow suspended solids to settle.

Contaminant Determinations

It is not anticipated that the construction of the project would introduce contaminants into project area waters or to appreciably redistribute contaminants which might already be present.

Aquatic Ecosystem and Organism Determinations.

Over the years, Texas Chute has experienced sedimentation impacts. As a result, the chute is only a fraction of its former depth. During an

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environmental resources inventory, only two groups of benthic organisms were collected; chironomidae and oligochaeta. This low diversity was attributed to low flow and substrate type. The deepening of Texas Chute would have benefits over the long-term by consequent improvements in water quality. Both the fishery and the benthic community would improve. Mississippi River backwater areas near the mouth of Mill Creek are anticipated to be less severely sedimentad than Texas Chute, and are expected to have a more diverse benthic community.

The concrete floodwall footing would be placed in Curtis Creek just downstream from the Highway 57 bridge where the creek is relatively deep, has a slow flow, and a soft bottom. Only Oligochaetes were collected in this general area (the sampling station is about 1,500 feet downstream). The low diversity was attributed to poor water quality, substrate type, and the combination of low flow and greater mean depth. Just upstream from the Highway 57 bridge where riprapping would occur (no riprap anticipated to be below the ordinary high water mark), the creek is in a transition zone between the poorer quality conditions downstream and the better quality upstream. Just upstream from the riprap area, 14 invertebrate taxa were identified with chironomidae, A. intermedius, and ephemeroptera representing the dominent taxa.

No significant impact to endangered species is anticipated as a result of this project.

The only federally listed endangered species reported for the project area is the American bald eagle (Haliaeetus leucocephalus). Lock and Dam 21 is in the northern part of the project area and bald eagles frequent the riverbank areas above and below the lock and dam during the winter months. These riverbank areas, especially those below the lock and dam, would be considered critical use areas for the bald eagle. The existing levee alignment comes within about 700 feet of these riverbank areas on the northern end and rapidly falls away to about 2,000 feet or more at the southern end of the eagle-use area. At the north end of the mainstem levee near the mouth of Curtis Creek, the levee comes within about 250 feet of riverbank trees reported to be used by eagles as perches. This area is across the mouth of Curtis Creek from the levee and is not as critical a use area as the areas below the lock and dam appear to be. Human activity is normal since a paved road runs along the top of the levee.

At the south end of the mainstem levee near the mouth of Mill Creek, the levee comes within about 250 to 500 feet of another reported eagle-use area. The expanse between the levee and the shoreline is heavily wooded and provides a good screen between the eagle-use area and the shoreline. Hydraulic dredging activities in Texas Chute would be at least 1,000 feet from reported eagle-use areas. Dredging activities near the mouth of Mill Creek would come close to a reported eagle-use area. Dredging activities, though, would be restricted to seasons of the year when eagles would not be present. Thus no significant impacts to the species are anticipated. A letter supporting this determination from the US Fish and Wildlife Service, Office of Endangered Species can be found in Appendix C, Pertinent Correspondence, of the main report.

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The Higgins' eye pearly mussel (Lampsilis higginsi) is a federally listed endangered species. The Higgins' eye is a large-river, deep-water mussel and could occur in the project area. However, an environmental resources inventory of the project area performed by a private contractor reported that no freshwater mussels listed as rare or endangered have been reported from the project area of collected as part of the environmental resources inventory study.

Four endangered species (one mammal and three plant species) listed by the State of Illinois are reported to be found in Adams County. These species are the gray bat (Myotis grisescens), sedge (Carex prasina), buffalo clover (Trifolium reflexum), and arrowwood (Viburnum molle). From descriptions of habitat requirements, the only species listed which could be affected by the project is the sedge (Carex prasina). This species is reported to have been found only in a State Park. The closest State Park is located approximately 6 miles north of the study area. Therefore, raising the existing levees is not anticipated to impact any endangered species listed by the State of Illinois.

Proposed Disposal Site Determination

The disposal site along the levee would be diked and equipped with weirs to return excess water to the river systems. Therefore, water runoff would be controlled, the settling of solids would be maximized, and water quality impacts would be minimized.

Although no water quality parameters were measured for Texas Chute, an area 6 miles upstream known as Quincy Bay was analyzed for various water quality parameters in 1979. Since both are non-main channel waters that experience sedimentation impacts, the Quincy Bay data may be indicative of Texas Chute. The results of the Quincy Bay test are shown in table 1. From these results and the similarities of the two areas, it is anticipated that the project would have no significant impact on water quality, especially if the dredged material disposal area is diked to achieve settling of solids. Water quality conditions in Mississippi River backwater areas near the mouth of Mill Creek are anticipated to be better than in Texas Chute and impacts from dredging are anticipated to be less.

No elutriate test data is available for Curtis Creek. Any water quality effects of disturbing the creek sediments by floodwall construction activities will be temporary.

The human use of the project area along the mainstem levee is primarily agricultural. The adjacent areas next to Curtis Creek are used for industrial purposes while the areas adjacent to Mill Creek are agricultural. The completion of these proposed actions would facilitiate these human uses of the area during floods by providing additional flood protection. Therefore, the proposed actions would have no appreciable negative effects on these uses.

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Determination of Cumulative Effects on the Aquatic Ecosystem

Negative effects to the aquatic ecosystem would be contributions to turbidity and impacts to water quality. The impacts to turbidity and water quality would be temporary. A relatively small area of poor quality aquatic habitat would be displaced by the concrete footing of a proposed floodwall. The deepening of Texas Chute as a result of dredging will have positive environmental benefits through improved water quality. Four and a half acres of wetland/slough type habitat will be permanently impacted by expansion of the levee base. A mitigation plan for impacts to wetlands has been adopted and is described in the Final Environmental Impact Statement for the project.

III - FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

Adaptation of the Section 404(b)(1) Guidelines to This Evaluation

The proposed project is in compliance with Section 404 of the Clean Water Act.

Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Sites Which Would Have Less Adverse Impact on the Aquatic Ecosystem

The designation of disposal sites was coordinated with the US Fish and Wildlife Service. Riverward expansion of the mainstem levee was eliminated from further consideration because it would result in greater impacts to the natural resources of the project area. The proposed action would have fewer environmental impacts.

Texas Chute was selected as a hydraulic borrow site because positive environmental benefits are anticipated. Texas Chute was one of the backwaters recommended by the GREAT II Side Channel Work Group which could benefit from deepening its water. Mississippi River backwater areas near the mouth of Mill Creek designated for hydraulic borrow are close to the south end of the mainstem levee. Other hydraulic borrow sites would be available, but may not be cost effective.

No other construction alternatives were available for improvements to the existing floodwall at Curtis Creek because industrial developments are directly adjacent to both banks of the creek. Deepening the streambed of the creek would not be economically feasible and would create additional environmental concerns.

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Impacts to 0.5 acre of the 1-3/4-acre wetland area along Mill Creek which would be encroached upon by creekside expansion of the Mill Creek flank levee are unavoidable. Landward expansion of the levee base in this area would encroach upon a farmstead.

Compliance With Applicable State Water Quality Standards

Compliance with State water quality standards is accomplished through application for certification or waiver of certification under Section 401 of the Clean Water Act. This would be accomplished before the start of construction.

Compliance With Applicable Toxic Effluent Standards or Prohibition Under Section 307 of the Clean Water Act

It is not anticipated that the project would introduce toxic substances into nearby waters or result in appreciable increases in existing levels of toxic materials.

Compliance With Endangered Species Act of 1973

No significant impact to federally listed endangered species is anticipated as a result of this project. A letter from the US Fish and Wildlife Service, Office of Endangered Species, supporting this determination can be found in Appendix C, Pertinent Correspondence, of the main report.

Compliance With Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research and Sanctuaries Act of 1972

The project is in a fresh water inland river system. No marine sanctuaries are involved.

Evaluation of Extent of Degradation of the Waters of the United States

No municipal or private water supplies would be affected by the proposed actions. The dredging of Texas Chute would deepen the resource with consequent improvements in water quality. Turbidity and water quality impacts to Texas Chute, Mississippi River backwater areas near the mouth of Mill Creek, and Curtis Creek would be temporary. Four and a half acres of wetland/slough habitat would be permanently impacted. A mitigation plan for wetland impacts is described in the Final Environmental Impact Statement for the project.

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Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

The materials that would be used to increase the height of the existing floodwall would be chemically and physically stable, and noncontaminating. Riprap would also be chemically and physically stable, and noncontaminating.

The dredged material deposition site would be diked to achieve maximum settling of solids, and would be equipped with weirs to control the return of excess water to the river system.

Conclusions

The following four aspects of the proposed South Quincy Drainage and Levee District Flood Damage Reduction project will require processing under Section 404 of the Clean Water Act.

a. The dredging of Texas Chute and Mississippi River backwater areas near the mouth of Mill Creek for hydraulic borrow.

b. The placement of dredge material on the landward side of the existing mainstem levee which would impact 4 acres of wetland/slough habitat.

c. The placement of approximately 500 linear feet of floodwall footings into the waters of Curtis Creek along with approximately 300 linear feet of riprap (not anticipated to be below the ordinary high water mark).

d. Impacts to approximately 0.5 acre of wetland/slough type habitat along the Mill Creek flank levee from creekside expansion of the levee base.

These actions would be in compliance with the requirements of guidelines for Section 404(b)(1) of the Clean Water Act, as amended.

The implementation of these actions would not permanently and significantly impact water quality or the integrity of the acquatic ecosystem.

BERNARD P. SLOFER
Colonel, Corps of Engineers
District Engineer

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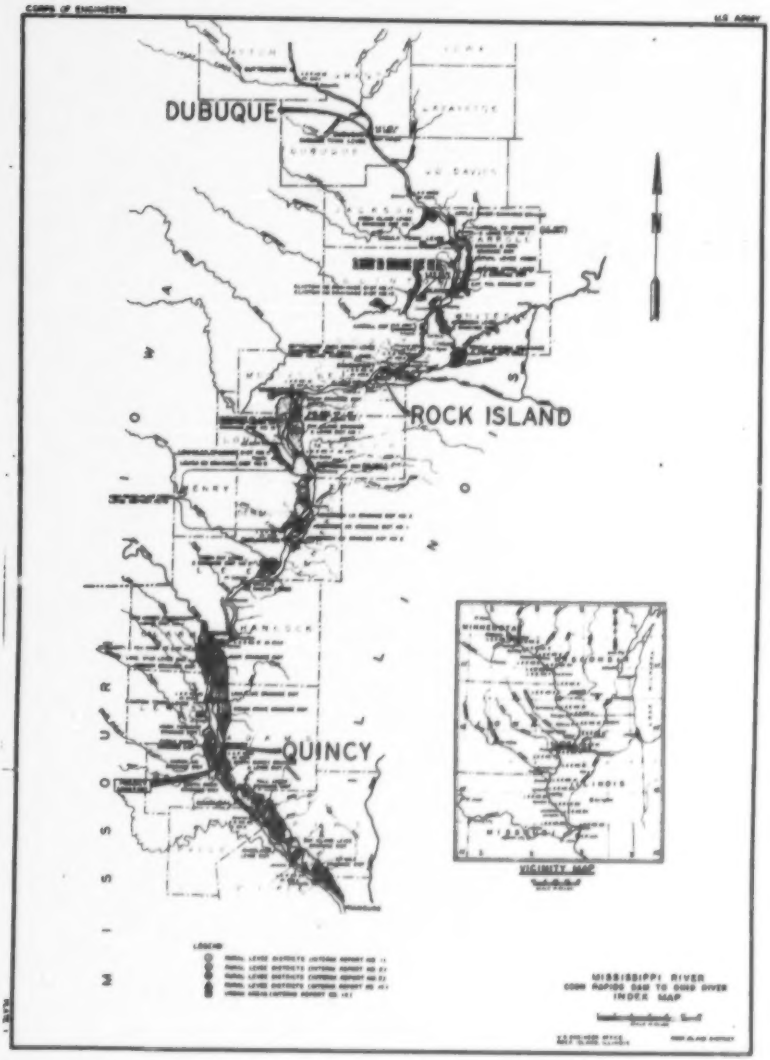

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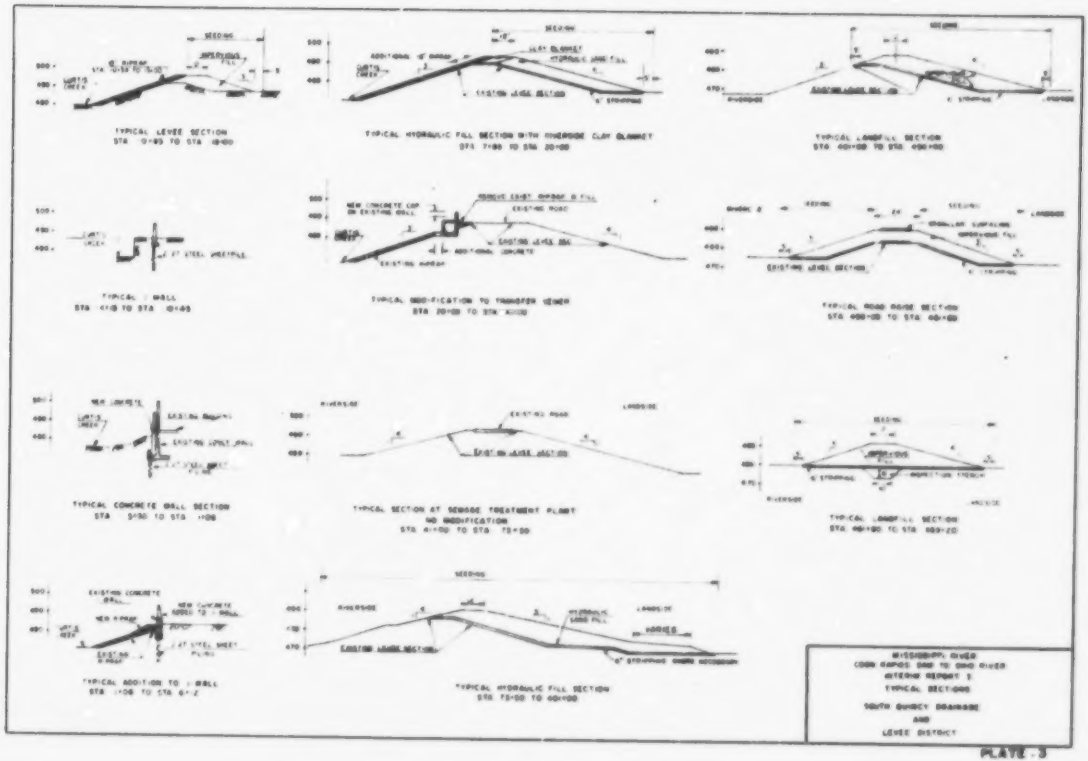
TYPICAL LEVEE SECTION
STA 0+00 TO STA 18+00
TYPICAL HYDRAULIC FILL SECTION WITH RIVERSIDE CLAY BLANKET
STA 7+00 TO STA 20+00
TYPICAL LANDFILL SECTION
STA 40+00 TO STA 49+00
TYPICAL I WALL
STA 41+0 TO STA 10+00
TYPICAL MODIFICATION TO TRANSFER VIEWED
STA 20+00 TO STA XX+00
TYPICAL ROAD RAISE SECTION
STA 49+00 TO STA 60+00
TYPICAL CONCRETE WALL SECTION
STA 5+00 TO STA 1+00
TYPICAL SECTION AT SEWAGE TREATMENT PLANT
NO MODIFICATION
STA 6+00 TO STA 12+00
TYPICAL LANDFILL SECTION
STA 49+00 TO STA 63+22
TYPICAL ADDITION TO I WALL
STA 1+00 TO STA 6+2
TYPICAL HYDRAULIC FILL SECTION
STA 12+00 TO 60+00
MISSISSIPPI RIVER
COON BAYOU AND TO OAKS RIVER
INTERIM REPORT 1
TYPICAL SECTIONS
SOUTH DUDLEY DRAINAGE
AND
LEVEE DISTRICT
PLATE - 3

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